The Chemical Age

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The
Chemical Age

The Weekly Journal of Chemical Engineering and Industrial Chemistry

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The Spanish Experiment

THE problem which preoccupies industries around the world more or less intimately, according to their geographical situation and consequent political colouring, is their relationship with the State, whose tendency to exercise greater control is familiar in all countries.

Various gigantic experiments have been tried or are in progress, and a constant factor in world history during the past few decades has been the philosophy underlying these attempts to transfer ultimate authority in industry into new hands. It is frequently objected that economics and the like cannot be true sciences, because they lack the essential attributes of measurement and prediction, and unsuccessful experimentation may result in disastrous consequences. Yet experiment of a sort, whether scientific or not, is being tried on a large scale; and the chemist today, intimately associated with modern industries, has more reason than most to be keenly interested in its form and progress.

The common factor in all these experiments is that they are dictatorships in one form or another, and differ only in degree. Whether the syndicate system in Spanish industry is a worse or better, a weaker or stronger manifestation of dictatorship, is difficult to say. So much has already been published concerning its peculiar political and economic features that there is little need to add to it. It appears, however, that its leading exponents find it necessary from time to time publicly to reaffirm their faith and even present to the world some sort of apologetic.

Whether this is or is not influenced by secret misgivings, the fact remains that an important statement of faith and works was recently made at a meeting (July 13) of the Spanish Syndical Economic Council. The main work of this meeting (Pleno) was to consider progress made, more especially in regard to fertilisers, cement, and seed wheat, of which further details are being published (*ION*, July 1949, pp. 397-398). Señor Arias Salgado, the Minister and Secretary-General of the movement, introducing these reports, emphasised the national and international difficulties which confront any undertakings of this kind and, rather expectedly, affirmed his faith in the great possibilties opened up by vigorous and far-sighted planning: "By virtue of our spiritual and political advance, the health and well-being of the Spanish people has been, these last ten years, and is to-day, surprising; especially if one compares it

On Other Pages

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with the position prior to 1936." It will probably be remarked that, while the spiritial basis of this result is open to doubt, the scope for improvement in a country socially and economically as backward as Spain was makes spectacular betterment easily credible.

In his speech, the Secretary General said that the Economic Council followed the right path of responsibility and competence laid down by the syndical organisation, involving also a scrupulous "technical awareness." The meaning of the last is a little obscure, but apparently these qualities are to ensure that the Syndicates are fitted to control Spanish industry. In any event, it is not possible to go back to that regime of liberty as it was known before 1914, and was characterised by strikes, lockouts, uncontrolled production, and finally the crisis.

The Secretary-General insisted that increased production should be the principal aim of all concerned (the danger of overproduction is clearly not likely to be an urgent problem in Spain at present), but he, too, confirmed the existence there of the trouble common to many other economies. Some workers did not render their proper quota, and some employers were much more interested to maintain a certain price level, and to limit production. Spain evidently has come to recognise that there cannot be unbridled liberty, nor, on the other hand, too much control. In an endeavour to strike the happy mean the Spanish syndicates have been organised on the principles already well known. On the whole the speaker thought they have done good work, but they have undoubtedly been subjected to sharp criticism in Spain itself.

In this connection it is of interest to recall that, during the course of several months of last year, the editorial columns of *ION* were open to "The Industrialists." Questionnaires were issued to leading representatives of various industries seeking information on the reasons why particular industries were not in the flourishing position they could have been. There was some plain speaking in many of the replies which emphasised in particular the difficulties created by a wrong tariff policy and other alleged mismanagement at the higher levels. To what extent the

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Notes and Comments

Export Compensations

EXPORTS of British chemical industries have reflected fairly closely the heightened difficulties in overseas markets which have been responsible for the further cut in all British foreign sales to £141.668 million in July. The Board of Trade records of chemical trading, however, serve to remind one how comparatively resilient is this branch of export industry. Comparison of July with the corresponding period a year ago discloses that sales of heavy chemicals, excluding drugs and dyestuffs (£3.56 million), were reduced by almost exactly £1 million, and paints, pigments, etc., were almost halved. Yet the final account for all the combined sections (£6.434 million) was little more than £1 million less that the corresponding total a year ago. Chemical industries, collectively, have a highly developed capacity for recovering on the swings what is lost on the roundabouts. This is apparent both in the capacity of certain groups to compensate with increased trading much of the recession in other sections and in the stabilising effect of varying fortunes in the widespread foreign markets. Thus, while there have been heavy reductions in sales to India, Ceylon, Argentina, the U.S.A., Egypt, Belgium and the Scandinavian countries, chemical sales to British countries, including the African countries, and to Brazil and Iran, have gone far to wipe out the discrepancies.

Italian Initiative

WHEN taking stock of the external factors affecting British chemical trading, insufficient weight would seem generally to have been credited to the reviving forces in Italy. There, many of the crippling political and economic drags are being cast off and the characteristic enterprise represented by such undertakings as the synthetic nitrogen products, which may yield 175,000 tons of nitrate by the end of this year and probably 210,000 tons a year later, is displaying itself in many sections of industrial chemistry, which in 1948, were employing 140,000 workers. Maximum expansion of chemical exports is the declared policy and that objective is being brought appreciably nearer by the imaginative fuel programme, including the wide exploitation of natural methane gas, to overcome the uncertainties of hydro-electric supplies. Emboldened by the yield of 130 million cu. m. of the gas in 1948, largely from Venetia and Emilia, and the prospect that the flow will have been doubled by the end of this year, large industries, such as Pirelli, Marelli and Dalmine, are substituting it for a large proportion of their coal supplies, and entire cities—Verona and Padna among others—have been "methanised" on a very wide scale. The gas in Italy has a thermal value equal to rather more than a litre of high grade liquid fuel of 1.5 kg. of coal, so that the saving which may be effected if this programme for 1000 million cu. m. of the gas by 1952 is carried into effect will be significant. While large reservoirs of methane gas remain untapped, plans are being advanced to provide gas engineering equipment which may later bring to Italian industries a large supplementary source of fuel and some raw material.

American Chemical Plant

THE closer community of interests between British and American chemical process industries is reflected in the current indications that there will be more visitors from this country than ever before at the 22nd Exposition of Chemical Industries in New York this autumn (November 28—December 3). Although this is characteristically American in outlook, conditioned by the needs and economics of U.S. chemical industries, fundamentally the objectives are, of course, very

much the same of those of counterpart industries here and there is now a further common ground in the fact that growth of overseas competition and latterly a slackening of buying interest has forced upon U.S. chemical process industries an urgent need to cut costs. The answer in the U.S.A., where labour charges are higher than anywhere else in the world, is normally the installation of new plant or the adoption of new processes, so that this autumn's show is designed to be more than ever an exposition of the progress in chemical engineering and chemical plant production. A large proportion of newly designed plant is being kept under dust covers until the exhibition opens. Some indication of the sectors likely to benefit most from plant research in America is gained by reference to some trading results. Plastics, for example, in their extraordinary varied range of applications, will, as usual, dominate very large sections of process equipment and materials; vast sales commanded by pharmaceutical products are another determining influence. The latter is clearly not an ephemeral effect. In 1947, U.S. penicillin is credited with having earned $87 million, vitamins $35 million and streptomycin $24 million.

More Natural Rubber

EVIDENCE that there is a growing awareness of the danger to natural rubber of the large-scale substitution or synthetic rubber is given in a statement by Mr. Paul Shafer, chairman of the 80th Congress House Armed Services Sub-Committee, the body which helped to formulate the U.S. Rubber Act of 1948. Mr Shafer suggests two major changes in the Administration's rubber policy. He recommends that the Munitions Board should begin at once to purchase natural rubber in large quantities for Government uses, and that the Department of Commerce should reduce the amount of synthetic rubber it requires U.S. manufacturers to use each year, or even cancel the regulation. Although the 1948 Rubber Law seeks to ensure yearly consumption of only 215,0000 long tons of synthetic rubber, its effect last year was to produce consumption of 442,000 tons. America has now been told, by one of its own experts, of the considerable responsibility it bears for its failure to buy the substantial quantities of natural rubber, available at reasonable prices. That is, of course, one of the larger factors in the continuing shortage of dollars throughout Empire countries. The recent announcevent by the ECA mission to the United Kingdom that it has purchased through the London market approximately 21,000 long tons of natural crude rubber, at a cost of about £2.1 million, appears as an encouraging sign that the campaign to "freeze out" the natural product is being moderated.

THE SPANISH EXPERIMENT

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syndicates were responsible is not clear—and tariffs, at all events, were probably outside their scope—yet it was manifest that the industrialists had had small reason to like these controls.

The work of the National Institute of Industry (Instituto Nacional de Industria) since its establishment on December 31, 1947, has been described in an official publication of 160 pages (*ION*, July 1949, 446-7). This reflects the emphasis being laid on programmes to develop liquid fuels and lubricants, bituminous shales and lignite. There have been tangible rewards. Nitrogen, activated carbon and artificial fibres are all shown to have received some stimulus under the syndical system and mineral and fishery industries are intended to gain a new important status. The intention is to rebuild Spanish industries on an entirely new basis. That aim would stand much better chances of being realised if the dictators had a clearer appreciation of the great benefits which could accrue if Spain bought more plant, for such things as ammonia synthesis, and less of the finished products.

PRESSURE & VACUUM PLANT

British Standard Tests

ACCEPTANCE tests for positive-displacement compressors and exhausters have just been issued by the British Standards Institution, under BS 1571 : 1949.

These British Standard acceptance tests lay down the conditions under which reciprocating and rotary compressors and exhausters shall be tested in order that guarantees made by manufacturers in regard to output, power consumption or speed may be verified.

Deviations of the test conditions from the guarantee conditions within which the tests are applicable are noted and guidance on pressure and temperature measurement is given. A recommended form of test report is also included, together with diagrammatic arrangements of the test layouts for the four types of machines covered.

In drawing up the standard tests every endeavour was made to minimise the corrections which have to be applied to the test results to provide for the deviation between the test and the guarantee conditions. The corrections to power consumption for variations of inlet pressure and pressure ratio are therefore extremely simple, provided that these are within the standard deviation. No correction is applied to power consumption for variations of cooling water temperature within the 15°F. deviation from guarantee conditions permitted.

Varying Factor

Experiments with cooling water temperatures differing by 30°F. have shown that the difference between friction horse power due to the changes in oil temperature which are created through changes in water temperature—for which no correction can be made—have as much influence on the power consumption as the variation in the cooling water temperature.

This standard is to be followed by a further standard which will deal with acceptance tests for aero-dynamic or turbo-type compressors and exhausters.

Copies of this standard may be obtained from the British Standards Institution, London, S.W.1, price 2s. 6d. post paid.

" Polyalkylene Glycols "

The graphical illustration of the hygroscopicity of certain polyalkylene glycols illustrating the article on this subject (THE CHEMICAL AGE, *60*, 220-222) was originally produced by the Carbide and Carbon Chemicals Corporation, U.S.A., producers of the Ucon synthetic materials.

MINERAL DEVELOPMENT

Criticism of Official Report

ONE of the few comments made upon the recently published report of the Mineral Development Committee (THE CHEMICAL AGE, *61*, 137, etc.) comes in the form of a letter from Athole G. Allen (Stockton), Ltd., to the secretary of the committee, Mr. W. C. C. Rose, the contents of which have been communicated by the company to THE CHEMICAL AGE.

This letter, which serves to throw further light on the investigations on which the mineral resources survey was based and upon the enterprise in the same field of at least one private organisation, includes the following observations :—

When we received the first communication, dated May 9, 1949, from you, inviting our approval of the wording relative to our Closehouse barytes mine, we did not understand the report had been signed already—six weeks previous, and that consequently we could not take any part in the inquiry by giving evidence before the committee, nor be recognised or acknowledged in any way.

There is no reason at all why we should have been ignored.

Much of what is said in the report as to the efficient working of mineral resources in this country we have been doing for the past 12 years.

We still have, and regularly operate at our chemical works at Stockton-on-Tees, dressing, processing and grinding plant with a capacity of 400 tons weekly of barium minerals and facilities for extension to double or treble this tonnage.

In 1935 we first approached the New Brancepeth Colliery Co., Ltd., and ultimately persuaded them to restart production. We entered into a long-term contract—still in existence—to take the whole of their output, and in addition to our own requirements we have supplied many thousands of tons to consumers who were temporarily short of supplies.

By the courtesy of The New Brancepeth Colliery Co., Ltd., in company with our barytes mines manager, we have visited the deposits and obtained a very favourable impression of all we have seen. From time to time we have renewed our offer of any assistance if required and/or to take over and work the deposit for our own account if this should be considered at any time.

After much exploration, about 1938 we secured a lease covering 8500 acres in Lunedale, where our Closehouse and our Lunehead mines are situated.

We have constructed a good road two miles long over difficult moorland, erected an up-to-date dressing plant, including power units, hostel and office accommodation, with shower baths, changing, clothes drying, and mess rooms.

All this is well known to various Government departments, trade associations, chambers of commerce, and development boards. Why, therefore, should we be treated as though we counted for nothing ?

The ore reserves in the report for Closehouse are calculated on the basis of 100 per cent $BaSO_4$. Conjectural figures have been avoided, but if given would show the reserves to be equal to any other barytes mine in the country.

Had we been invited to give evidence before the committee, we believe we could have made a contribution of value.

The report doubtless will be used as an authority for future references of the barytes industry, and it is reasonable, therefore, that our interests should be adequately stated and not submerged in big sectional interests.

TEES CHEMICAL PROJECT

Inauguration Next Month

WHAT is claimed to be the greatest single project in the expansion of Britain's chemical industry will be inaugurated at Wilton, Middlesbrough, on September 14.

The enterprise, which will have cost £22 million, is part of the Imperial Chemical Industries' scheme for new chemical processing factories being built upon a site of several thousand acres on the south bank of the Tees (THE CHEMICAL AGE, *58*, 607).

The opening ceremony will be performed on Wednesday, September 14, by Lord McGowan, chairman of I.C.I., who will conduct a tour of the new plant.

The new installation is a plant to crack petroleum to give a maximum yield of the simpler olefins which will serve as the starting points for the manufacture of a large range of more complicated organic chemicals.

Increased employment will be provided for the area. It is estimated that 3000 people will be employed at an early date, 8000 by 1951, and 11,000 four years later.

U.K. Light Metal Statistics

MINISTRY of Supply statistics relating to light metals in June and the first half of the year have now been issued

These figures are given below (in long tons) in comparison with figures for the same month and first six months of 1948.

	Total for first half		June	June
	1949	1948	1949	1948
Virgin aluminium :				
Production ...	15,681	15,240	2,648	2,528
Imports	71,345	69,227	9,236	15,240
Secondary aluminium :				
Production ...	38,017	44,825	6,223	6,403
Aluminium scrap arisings :				
Consumption ...	51,116	49,485	8,167	8,549
Aluminium fabrication	119,941	129,823	19,467	19,566
Magnesium fabrication	1,836	1,420	288	249

New South African Nickel Lode?

The nickel bearing ore deposits in the Insizwa Mountains in Pondoland, Eastern Cape Province, are to be exploited by a Johannesburg syndicate. Permission has been obtained from the Minister of Native Affairs to prospect the area, with authority to acquire a lease. Geologists report that the ore also contains platinum, gold, silver and copper.

STEEL INDUSTRY INITIATIVE

Service to Export Industries

THE story of the country's greatly increased output in the iron and steel industries during the post-war years is told in fuller detail than usual in *Steel News*, issued by the British Iron and Steel Federation.

Imports of iron ore—increased from 4,134,000 tons in 1945 to 8,539,000 tons in 1948—have provided most of the raw material with which production records have been broken, enabling manufacturers to make more goods for export, often, it is stated, at 100 times the value of the ore imported for them.

Compared with the pre-war period, exports of goods using steel have been doubled, until they now represent nearly 50 per cent of Britain's total.

Though large quantities of iron ore are mined in Britain, they contain only 30 per cent or less of iron. Iron ore from overseas generally contains as much as 60 per cent or more. It takes, moreover, nearly as much coal to extract the 30 per cent of iron from English ores as it does the 60 per cent from those imported. Imported ore, therefore, saves thousands of tons of coal.

BISC (Ore), Ltd., is the organisation set up since the war by the iron and steel industry to act for manufacturers, buying ore, arranging shipping and handling many other problems. Substantial savings in the large transactions involved have been made by this arrangement, with consequent benefit to manufacturers.

The industry has taken the initiative by engaging mining experts not only to investigate existing sources of ore, but to explore possible new supplies in different parts of the world.

Mechanical Handling Exhibition

AS a result of the success of the first Mechanical Handling Exhibition held in July 1948, the exhibition is to be repeated at Olympia, London, from June 6-17, 1950.

The next annual display will be larger than the first one, both the Grand and National halls being used, and the run being for 11 instead of nine days. It is hoped that the inclusion of two Saturdays may enable visits to be made by factory managers, foremen, and operatives.

Exhibits will cover the full range of equipment for the handling, lifting, stacking and short-distance transportation of goods.

CHEMICAL EXPORTS FALL

July Total was £512,718 Less than June's

IN common with the general trend of the country's overseas trading, chemical exports from the United Kingdom in July, valued at £6,434,589, were lower than the June figure. The reduction was £512,718 and the total was £1,146,250 less than in July, 1948. Notable decreases from June totals included salicylic acid, from 120,362 cwt. to 85,078 cwt.; ammonium sulphate, 33,262 to 27,865 tons; bleaching powder from 29,752 to 19,429 cwt.; cresylic acid, from 83,565 to 67,351 gal.; collodion cotton, from 3343 to 1741 cwt.; disinfectants, insecticides, etc., from 52,275 to 39,774 cwt.; plastic materials from 33,344 to 27,099 cwt.; chemical glassware, from 1008 to 738 cwt.

The few notable increases included tar oil, creosote oil, etc., from 1,129,355 to 3,011,191 gal.; fertilisers, from 811 to 2317 tons; tetra-ethyl lead, from 86,586 to 152,142 gal.; salt, from 15,321 to 17,767 tons; sodium carbonate, from 150,372 to 266,694 cwt.; caustic soda, from 157,998 to 215,571 cwt. Representative totals are as follows:—

CHEMICAL EXPORTS

	July 1949	July 1948
	Cwt.	Cwt.
Formic acid	4,160	2,172
	Lb.	Lb.
Salicylic acid and salicylates	85,078	223,216
Value of all other sorts of acid	£60,651	£70,262
	Tons	Tons
Aluminium oxide	26	414
Sulphate of alumina	2,718	2,179
All other sorts of aluminium compounds	1,403	619
Ammonium sulphate	27,895	38,126
Ammonium nitrate	3,216	7,042
All other sorts of ammonium compounds	1,265	1,335
	Cwt.	Cwt.
Bleaching powder	19,429	33,386
All other bleaching materials	9,073	11,546
	Gal.	Gal.
Cresylic acid	67,351	276,938
Tar oil, creosote oil, anthracene oil, etc.	3,011,191	3,102,099
Value of all other sorts of tar oil	£31,215	£142,078
	Cwt.	Cwt.
Collodion cotton	1,741	1,781
	Tons	Tons
Copper sulphate	4,402	2,038
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	39,774	85,194
	Tons	Tons
Fertilisers	2,317	1,832
	Cwt.	Cwt.
Nickel salts	5,990	3,690
Lead acetate, litharge, red lead, etc.	5,680	12,406
	Gal.	Gal.
Tetra-ethyl lead	152,142	65,375
	Tons	Tons
Magnesium compounds	904	879
	Gal.	Gal.
Methyl alcohol	3,850	10,788
	July 1949	July 1948
	Cwt.	Cwt.
Potassium compounds	5,325	8,635
	Tons	Tons
Salt	17,767	13,987
	Cwt.	Cwt.
Sodium carbonate	266,694	432,545
Caustic soda	215,571	164,562
Sodium silicate	24,001	18,388
Sodium sulphate	62,036	51,512
All other sodium compounds	61,707	96,461
Cream of tartar	253	156
Tin oxide	200	661
	Tons	Tons
Zinc oxide	668	1,276
Total value of chemical manufactures, excluding drugs and dyestuffs	£3,560,644	£4,518,233
	Oz.	Oz.
Quinine and quinine salts	177,954	199,940
	Lb.	Lb.
Acetyl-salicylic acid	103,639	147,445
	100 International units	100 International units
Insulin	612,891	1,600,312
	Mega units	Mega units
Penicillin	564,271	422,897
Total value of drugs, medicines, and preparations	£1,158,384	£1,267,922
Total value of dyes and dyestuffs	£935,133	£756,655
	Cwt.	Cwt.
Plastic materials	27,099	36,037
Value	£330,977	£452,721
	Cwt.	Cwt.
Chemical glassware	738	1,329
Value	£30,850	£50,147
	Cwt.	Tons
Fans	3,942	234
Value	£104,986	£106,329
	Cwt.	Tons
Furnace plant	6,572	369
Value	£84,100	£97,281
	Cwt.	Tons
Gas and chemical machinery	27,813	993
Value	£340,338	£209,126

CHEMICAL IMPORTS

	July 1949	July 1948
	Cwt.	Cwt.
Acetic acid	4,536	24,690
Boric acid	6,180	7,840
All other sorts of acid	8,640	3,506
Borax	19,000	17,728
Calcium carbide	1	4,237
Coal tar products (excluding benzol and cresylic acid)	—	11,821
Cobalt oxides	849	679
	Tons	Tons
Arsenic	143	1,230
Fertilisers	200	183
	Lb.	Lb.
Iodine	132,100	66,050
	Cwt.	Cwt.
Potassium chloride	700,963	813,454
Potassium sulphate	33,000	50,900
All other potassium compounds	1,525	4,672
Sodium nitrate	35,896	—
All other sodium compounds	7,760	3,613
Carbon blacks (from natural gas)	22,179	67,044
Total value of chemicals, drugs, dyes and colours	£1,943,137	£3,095,589

Industry in the German Bizone

Post-War Record for Fertilisers in June

ALTHOUGH a slight decline marked the index of industrial production of the Bizonal area for June, chemicals were one of the four groups which rose (in spite of the shorter month), showing a 2 per cent increase. This is recorded in the *Monthly Report of the Control Commission for Germany (British Element)*, Vol. 4, No. 6 (HMSO, 1s. 6d.).

The general situation in the chemical industry did not alter materially during the month. Good results are looked for from the improved short-term credit position and proposals for long-term loans at reasonable rates. The development in production was uneven, the total rising from 86 per cent to 88 per cent of the 1936 level.

Superphosphates

The output of fertilisers increased, potash rising to 58,200 tons and nitrogen and phosphate fertilisers reaching post-war records at 27,500 tons and 26,600 tons respectively. Stocks of the latter two types continued to increase, notably superphosphates.

Among the basic chemicals, output varied. Sulphuric acid, for which there is an excess of supply over demand, dropped from 78,200 metric tons to 71,600 tons. Calcium carbide rose from 42,800 tons to 45,000 tons—a post-war record. In the alkalis, production of caustic soda declined to 18,000 tons. Production of soda ash declined to 35,800 tons because of sales difficulties, which have led to an offer of some quantities for export.

In the field of finished products, the output of paints, varnishes, and lacquers was almost unchanged at 12,100 tons. Output of soap dropped from 6000 to 5500 tons, but that of washing powders rose from 15,000 tons to 17,100 tons. The manufacture of coal tar dyes rose from 1200 to 1400 tons, but is still below the 1600 tons produced in March.

In glass and ceramics, the same rate of production as in May was maintained.

The index for non-ferrous metals production declined to 75 per cent of the 1936 level, largely because of the shorter working month. There is no shortage of non-ferrous metals. The trade has continued to operate with minimum stocks to avoid capital outlay and the financial risks consequent upon falling prices.

The decline in world prices has passed the level at which lead and zinc mines in the Bizonal area can operate profitably. As a result, the German bizonal authorities have held domestic prices above world prices while an investigation into production costs is made. They are seeking to devise a subsidy method which will maintain the high-cost producers without giving the low-cost producers a windfall.

World prices for lead and copper have hardened recently but zinc remains weak. Zinc and lead were in good demand during June, mainly for building, whereas sales of copper and aluminium were slow. Demand for copper, zinc and lead semi-manufacturers improved during June.

On June 30 the 1948-1949 fiscal year closed with production of ingot steel for the month of June recorded at 750,300 metric tons. The May daily average production rate which was a record figure since the industry was re-started after the war was maintained.

When in January and February, 1948, the original steel plan for the 1948-1949 fiscal year was being prepared, the Military Governors intimated that the time had arrived to concentrate on this basic industry, which in importance ranks second only to coal. They indicated that an ingot steel tonnage of no less than 6 million tons should be set as the target.

The actual tonnage achieved against this target is 7,652,582 tons, which is 127 per cent of the original planned figure. The elimination by monetary reform of so many of the problems retarding production prior to June, 1948, together with the increased availability of raw materials—especially fuel, iron ore and steel scrap—and the improved power and gas situation, have all contributed to this satisfactory year of progress in steel production.

Exports of Gas

Gas produced in June was 122 million cu. metres, giving a total available for disposal and export of 652 million cu. metres, some 33 million cu. metres less than in May, but well above the June, 1948, figure of 500,759,000 cu. metres.

Final figures for May compared with April show increases in consumption by all industry groups except mechanical engineering which fell in spite of a greater number of working days.

The steel, chemical, and glass industries showed the most marked increases.

ALKALI CARTEL DECISION

U.S. Court Ruling Against Leading Companies

ELEVEN of America's largest alkali producing companies, all of which comprise the membership of the United States Alkali Export Association, are ruled to have violated the Sherman Anti-Trust Act by engaging in an international cartel to divide the world's alkali markets in restraint of the trade. This is the effect of a decision by U.S. Federal Judge, Samuel I. Kaufman, in New York.

The decision, which may have far-reaching effects on other export trade associations, relates in particular to the Alkali Export Association, known as Alkasso, and also affects the California Alkali Export Association (Calkex), Imperial Chemical Industries, Ltd., of Great Britain, and the latter's American subsidiary, Imperial Chemical Industries (New York), Ltd.

Other foreign alkali producers involved in the Government's anti-trust suit, named, but not cited as defendants, were Solvay et Cie., of Brussels, and I.G. Farben, of Germany. Producer defendants listed in the Government's case are: Pittsburgh Plate Glass Company, Inc.; Church and Dwight Company, Inc.; Diamond Alkali Company, Inc.; Dow Chemical Company, Inc.; Hooker Electrochemical Company, Inc.; Niagara Alkali Company; Pennsylvania Salt Manufacturing Company; Southern Alkali Corporation; Westvaco Chlorine Products Corporation; Wyandotte Chemicals Corporation; and West End Chemical Company, Inc. The last company is now the only member of Calkex, which formerly was composed of three companies.

Alkali Exports

In the court's decision the defendants were considered to have entered into agreements and engaged in practices to restrict exports of alkalis from the U.S.A.; to have prohibited imports of alkalis to the U.S.A.; curtailed and limited alkali production; eliminated competition; and fixed the prices of caustic soda in U.S.A.

Judge Kaufman has directed Government attorneys to submit findings of fact and conclusions of law in support of the framing of an injunction. The results of the Government's suit are thought to be capable of affecting "every export association which has been organised in the United States since 1918." Among such in the chemical field are the Sulphur Export Corporation (Sulexco), and the Carbon Black Export Corporation (Carboexport). The possible far-reaching effects of the decision would derive from the fact that the current ruling marks the first definite judicial interpretation of the 31 year-old Webb Export Act, which granted associations and combinations of firms engaged in export trade limited immunities from anti-trust laws.

Describing the elaborate system by which Alkasso was alleged to have prevented competitors in America from exporting alkalis, the court decision referred to the existence of an elaborate statistical system to obtain knowledge of all shipments exported by firms outside the association.

Sales in U.S.A.

Alkasso, the decision stated, maintained inspectors at docks within the United States to scrutinise material leaving America. Lists are stated to have been compiled by Alkasso and circulated throughout the association's membership to prevent future sales to such shippers. The decision found that purchasers of alkali in the United States were required to give a written promise that the product would not be sold outside the U.S.A.

With respect to the provisions and aim of the Webb Act, Judge Kaufman said: "The legislative history of the Webb Act, when considered as a whole, refutes any claim that the act was intended to leave the foreign commerce of the United States free of and unfettered by the anti-trust laws." Holding that the defendants had rigidly regulated the price and supply of caustic soda, the Judge said: "A suggestion is made that the stabilisation of price was not 'artificially enhancing or depressing' prices. The claim is baseless. Interpretation of the anti-trust laws does not turn upon such semantic niceties."

There was evidence, added the Court decision, that during the war shortages Imperial Chemical Industries and Alkasso employed the cartel as a means of allocating material. "In 1942," it was said, "Alkasso wrote to the (U.S.) Department of Commerce to protest against contemplated State action in dividing the South American markets between Britain and the United States. It is clear, therefore, that the war did not bring about a general abandonment of all cartel practices."

Applied Chemistry at Edinburgh

Ancient University's Services to Modern Industry

THE claim that the Edinburgh University Department of Chemistry Chemical Society was the first chemical society in the world is made in a survey of the department's work in relation to industry, just issued by the University Industrial Liaison Committee. The old barriers between pure and applied chemistry having been largely eliminated, the intention behind this survey is stated to be to advise industrialists of the facilities and people concerned with chemical research in the university, in order to facilitate liaison between university and industry.

Early Leaders

The chair of chemistry in Edinburgh University was originally combined with medicine, the first incumbent being James Crawford (1713). In the latter half of the eighteenth century one of its most distinguished occupants, Joseph Black, first made chemistry a quantitative science, and by his pioneer work on *magnesia alba* established the important conclusion that the " burning " of lime consists essentially in the loss of fixed air, not in the addition of phlogiston. Black's successor in the Edinburgh chair, Thomas Hope, is famous for his discovery of strontium.

Among the professors of chemistry at Edinburgh in the nineteenth century, Lyon Playfair (discoverer of the nitroprussides)—he later became Lord Playfair and, as Postmaster-General under Gladstone gave us the halfpenny postcard —and Crum Brown (who introduced the modern graphical method of writing organic formulæ, and anticipated Bragg by 30 years in presenting the lattice structure of sodium chloride) were particularly noteworthy. Nicol (inventor of the Nicol prism) and Couper (who shares with Kekule the credit for establishing the structure of aliphatic compounds) were students in the department.

Graham also published his law on the diffusion of gases while a student. Dewar discovered the use of charcoal in the production of high vacua and laid the foundation of his later work on the liquefaction of gases and the production of low temperatures while an assistant, and Hugh Marshall, another assistant, discovered persulphates.

In the present century, Sir James Walker, a leading physical chemist of his generation in Great Britain, organised the erection and management, by a staff recruited from the teachers, graduates, and undergraduates of the department, of a TNT factory which, at the conclusion of the first world war, held the record for efficiency of production in the whole United Kingdom.

During Walker's term of office at Edinburgh the present chemical laboratories at the King's Buildings were erected, and the last link with medicine broken by the institution of a separate chair of biochemistry. In 1947 a new professorship of organic chemistry was also established.

The chemical society of the department was existent under the sponsorship of Joseph Black in 1785. The first volume of its proceedings has recently been discovered in the archives of the Royal Irish Academy and restored to the library of the society; it is believed to constitute the first purely chemical journal in the world.

The present staff of the department consists of two professors, one reader, twelve lecturers, and about fifteen part-time assistants who are engaged in research work for the Ph.D. degree. Two I.C.I. Fellows are undertaking more advanced research. The staff is frequently called upon to advise Government departments, industrial firms, and private individuals on problems connected with all fields of chemistry—inorganic, physical, organic, analytical, and technical.

Research Programmes

The main lines of research undertaken by the staff include electrical conductivity of solutions, viscosity of liquid mixtures, formation of addition compounds, separation of isotopes, gas warfare, chemistry of the carbohydrates, with special reference to vitamin C and the polysaccharide group (cellulose, starch plant germs and mucilages), chemistry of explosives, researches on sugars, cellulose, and seaweed polysaccharides, and methods worked for estimating the chief carbohydrate constituents of Scottish seaweeds. Research into the properties of colloidal systems (soaps and other colloidal electrolytes, gelatin, colloidal sulphur, etc.), and surface chemistry (adsorption, surface films, etc.), reaction kinetics and methods of inorganic analysis, especially microchemical procedures, is also being undertaken.

SHALE-OIL FUEL RESEARCH

Opening of U.S. Experimental Refinery

WITH the completion of the first continuous shale-oil refinery in the U.S.A., the U.S. Bureau of Mines announces that the new 200-barrels-a-day experimental unit near Rifle, Colorado, has been put "on stream" without difficulty. A highly flexible, continuous unit, the refinery is designed to produce motor spirit, diesel fuel, heating fuels, and fuel gas from crude shale oils extracted at the bureau's oil-shale demonstration plant. It was built at a cost of $244,912.

Technology and Cost

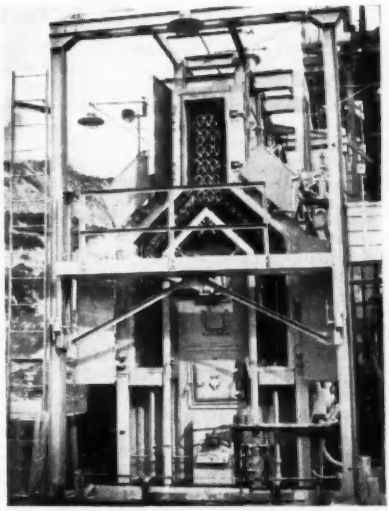
The commercial utilisation of America's gigantic oil-shale resources is a three-fold problem, the bureau states, involving mining the shale, retorting the shale to produce oil, and refining the crude shale oil into useful products. The operation of this new experimental unit, under the bureau's synthetic fuels research and development programme, is expected to answer for private industry some of the technical and cost questions of shale-oil refining. The mining problem has been largely solved, for the bureau's experimental oil shale mine has already achieved low-cost production. Work on the retorting problem is also well advanced.

All the bureau's installations near Rifle, Colorado—the mine, retorts, and refinery—will be on exhibition on September 20 and 21.

Major items of equipment include a furnace or heater, two coking chambers, a combination flash vaporiser and fractionator, stripper for the diesel fuel fraction, stabiliser for the naphtha fraction, absorber, and a re-run column for acid-treated motor spirit. With only minor changes, the same equipment can be used for atmospheric distillation, delayed coking, single coil re-cycle cracking, or re-forming. Facilities are also available for chemical treating of distillates.

In both function and design, the fractionation section is conventional. Heavy fuel residium is withdrawn from the flash vaporiser at the base of the fractionating tower. Gas oil and diesel fuel are taken off as sidestreams from the fractionator, and the diesel fuel is stripped of its light components before being stored.

The motor spirit fraction is taken overhead as a vapour and condensed. Uncondensed gases go to the absorber, where the condensible hydrocarbons are recovered and returned to the fractionator. Condensed motor spirit is pumped to the stabiliser for removal of excessive quantities of butanes and lighter hydrocarbons, and the stabilised motor spirit is then sent to the chemical treating unit.



Close-up of thermal cracking unit furnace designed for most conditions in liquid- and mixed-phase cracking, including re-forming

In the treating unit, the distillate first receives a dilute caustic wash for the removal of hydrogen sulphide, light mercaptans, and tar acids. This is followed by a dilute sulphuric acid wash for the removal of nitrogenous compounds in the form of tar bases. Thus freed of its chemically active compounds, the distillate is then subjected to three stages of counter current extraction with concentrated sulphuric acid for sulphur removal, improvement of colour, and oxidation stability. Next it is washed with water and neutralised with a final dilute caustic treatment. The distillate is re-distributed to remove the polymers formed in acid treating, and the specification end point distillate is returned to the treating plant for "doctor" sweetening.

Chemical Processing of Wood

Technical Advances in a Widening Field

by ERIK HÄGGLUND*

WOOD has been important, if not essential, throughout history—first as a fuel and later for the construction of homes, household utensils, ships, etc.; still later for the preparation of charcoal which for a long time was prerequisite for the manufacture of metals, especially iron. Large amounts of wood have been used, and are still being used, for railway ties. poles and props.

The latest development has been the use of wood as a fibre material, and in this case both chemical and mechanical methods have found an ever increasing use.

Industrial Development

These endeavours can be traced far back in history, but the question first became of great importance only about a hundred years ago, at a time when general industrial development, especially in the field of organic chemistry, began in earnest.

For many decades these attempts were empirical and clumsy, but were followed, later, by a realisation of the pressing need for a greater knowledge of the morphological construction and chemical composition of wood. This was especially true regarding the chemical reactions that occurred during the manufacture of paper pulp by the sulphite and sodium processes which had been discovered in the 1850's. This industry was destined to become, in the next half century, the most important in the chemical field as far as product value is concerned.

This, I admit, is quite surprising when one considers the size and importance of, for example, the oil and sugar industries. The production is continually increasing and will continue to increase, due to the ever increasing use of wood for new purposes such as paper supplies and cellulose products. There are countries which still consume very little of these products but which, in the future, will find greater and greater need for them.

Parallel to the great increase in pulp production has been the improvement in manufacturing methods. Of great importance has been the introduction of chemical control methods and an increased knowledge of the chemical course of the cooking process.

For a long time, many mills prepared specific types of pulps on the basis of empirical experience. In some cases this method is still used. When, however, the production of many types of cellulose for different kinds of paper, was to be accomplished, it was found that a more exacting reaction control was necessary.

This disclosed a fact of which we were apparently quite ignorant; namely, how unevenly the pulping process took place in different parts of the digesters, due to the lack of circulation of the cooking acid and the resulting temperature gradients. In this way the necessity of forced circulation was realised. After this problem had been solved, it was possible by analysis of the cooking acid and pulp samples to maintain the entire cooking process under complete control.

Other advantages followed, such as the ability to fill the digester with a large amount of chips without risking variations in the degree of pulping. Thus, it was possible to reduce considerably the amount of steam used and thereby obtain a waste liquor containing a much larger amount of organic substances.

The actual chemical reactions occurring in a cellulose cook had been, even at the turn of the century, only slightly investigated and knowledge regarding them was very vague. The cause of unsuccessful cooks, which occurred quite often then, and even occasionally now, especially in the preparation of sulphite pulps, was unknown. The research work of Peter Klason was a great contribution in this field. Still further research has been accompanied by a great reduction in the number of these unsuccessful cooks, so that they are now seldom seen.

Chemical Reactions

This could naturally only be accomplished by an investigation of the chemical reactions taking place during a cook. In the case of sulphite digestion, it was first necessary to determine the reaction mechanism of lignin dissolution.

It had been discovered very early that sulphite waste liquors contained a sulphonic acid of lignin. It was taken for

* In a paper delivered by Prof. Erik Hägglund, of Sweden, at the World Forestry Congress held at Helsinki last month.

granted that as fast as the lignin in the wood reacted with SO_2 a water soluble lignin sulphonic acid was formed. The course of the reaction is, however, not so simple.

Investigations made in the beginning of the 1920's showed that the primary reaction product was a solid lignin sulphonic acid which became soluble only after a simultaneous hydrolysis. The speed of both of these reactions depends on the prevailing hydrogen ion concentration.

Both the solid and soluble lignin sulphonic acids are strong acids—comparable to strong mineral acids. They condense very easily at higher temperatures and the acid thereby becomes insoluble and darkly coloured. This is the cause of the so-called "burnt cook."

Wood also contains, in addition to lignin and cellulose, the so-called hemi-celluloses or wood polyoses. Among the latter, there are some that are easy and some that are difficult to hydrolyse. Both the lignin and the wood polyoses hydrolyse during the sulphite process, which occurs in a relatively acid state.

Importance of Temperature

The relative speeds of these two reactions is decisive for a yield of pulp having a certain lignin content. The cooking acid's content of lime and free sulphurous acid acts as a regulator for both the sulphonation and hydrolysis reactions. The temperature also apparently plays an important part.

It might also be added that the lignin can be sulphonated to a more or less high degree in the solid state. It has been found that a highly sulphonated lignin sulphonic acid, such as is obtained with a high lime content, hydrolyses more easily than a weakly sulphonated one.

This behaviour explains the fact that a greater yield of pulp, with the same degree of delignification, is obtained from a cooking acid having a high lime content than from one having a low lime content.

A fundamental question that still cannot be considered as answered is the reaction between the lignin and the sulphite, or the sulphurous acid. We have good reasons for believing now that sulphonation takes place in different ways. There is certainly a group in the lignin that has strong condensation tendencies. This group easily reacts with sulphite under both acid and neutral conditions.

It has been found by analysis that there is one such group per 4 lignin units—corresponding to 40 carbon atoms and 4 methoxyl groups. The molecule is, nevertheless, still labile even after this sulphonatable group has reacted.

The free acid thus condenses very easily by heating to over 100°C. A stable condition is reached only after the sulphonation has progressed to the point where the lignin sulphonic acid formed has 2 sulphur atoms per 40 carbon atoms. Such an acid can, in lignin-rich pulp, be so stable that it is only partly condensed by 70 per cent sulphuric acid, which is generally used for the analytical determination of lignin.

Delignification of Pine Hearts

These relationships also explain why it is impossible to prepare sulphite pulp from pine heart wood. This fact was earlier explained by an assumption that the pores of the heart wood were more or less clogged by resin and that this hindered the diffusion of the cooking acid in the wood. At the time this explanation seemed acceptable.

Later, it was found that even after extraction with ether or benzene, which completely dissolve resin and fats, it was still impossible to delignify pine hearts. The belief was then advanced that the wood in pine hearts had been so changed by age that it was not possible to prepare pulp from it. This view, however, lost all meaning when we showed that the benzene-ether extracted heart wood could be easily delignified if it was extracted with alcohol or acetone before cooking.

It was apparent that by this extraction certain substances, which hindered cooking, were removed. It was found that these substances were not resins or fats but rather consisted of two different types of phenolic compounds. It could also be established that phenols, especially of the resorcinol type, can themselves generally condense with lignin in as acid a reaction as is found in a normal sulphite cook.

The Lignin Molecule

If, on the other hand, the pine hearts are treated first with a neutral or moderately acid sulphite solution at a high enough temperature the above mentioned easily condensable and sulphonatable groups become fixed, and the phenolic groups no longer have an injurious effect on the sulphite cooking.

It must, however, in this connection be emphasised that we do not yet know definitely the details of the constitution of the lignin molecule, nor can we say with certainty what kind of group in lignin reacts with the sulphite.

Another interesting question that we have studied is whether the lignin in dif-

ferent layers of the fibres is attacked and dissolved uniformly. It is necessary, before the solution is given, to point out that it was already believed that the lignin was very unequally divided in the different layers. That is to say, the lignin was very strongly concentrated in the middle and primary lamella and only a small amount was to be found in the secondary wall.

It is now known that the lignin in the middle and primary lamella dissolves relatively faster than the rest. The sulphonation reactions thus appear to originate in the outer layers of the fibre.

The chemical processes that occur in the soda cellulose processes, particularly the sulphate method, are likewise insufficiently studied, even though we have recently been able to make some noticeable improvements in this field.

Increased Solubility

A sulphide containing sodium hydroxide is more favourable for the digestion of lignin than pure sodium hydroxide is. This we interpret in the following manner: The sulphide reacts with the lignin to form a so-called "thio-lignin" which has a greater solubility. This increased solubility is probably mainly due to the fact that the previously mentioned reactive groups in lignin add sulphur and lose thereby a large amount of their condensation tendencies.

These reactions take place in the solid phase, that is, in the wood. A shorter time is required to dissolve such thio-lignin in a sulphate cook than the condensed lignin in a pure sodium hydroxide cook. Thus the cellulose fibres are not exposed as long to an alkali action, which tends to make the fibres brittle during the beating process and results in a greatly diminished mechanical strength.

If the chemical course of the cooking process is of such great theoretical and practical importance, this also must be true of further treatment of the pulp, such as bleaching and other related chemical operations.

Our knowledge of the reactions occurring during bleaching has been greatly advanced during the past 20 years, and has lead to revolutionary changes in cellulose technique. Especially important has been the bleaching with chloride. I should perhaps use the words "further delignification" instead of "bleaching" since the latter term has a connotation of increased whiteness. It has actually been known for a long time that chlorine, especially in combination with alkali treatment of the chlorinated pulp, can convert lignin into water soluble products.

After good technical methods for chlorine treatment had been found, it was possible to utilise to advantage what had previously been called "non-bleachable pulp," or in other words pulp with a high lignin content. After a good deal of experimentation, methods were found to utilise this in the preparation of pulps of highest whiteness and with strength properties that were equal to, or perhaps insignificantly less than, the unbleached pulp.

This technique was especially of great importance in the bleaching of kraft pulps. In this case it was found necessary, however, in order to obtain pulp of great whiteness and strength, to use chlorine dioxide in the final stages of the bleaching instead of hypochlorite. This compound had not previously been used as a bleaching agent. It was also found that the chlorine treatment could be made more effective by combining it with a hypochlorite oxidation.

These developments in the bleaching field have also facilitated the manufacture of new types of bleached paper pulp from birch by the sulphate process.

Chemical research in the field of pulps for chemical uses, so-called "dissolving pulps" has been no less intensive than in the field of paper pulps. Such pulps are mainly prepared by the sulphite method. To a lesser extent, alkali digestion has been used, but only in connection with so-called "pre-hydrolysis." In either case it is desired to remove, as much as possible, the hemicelluloses and at the same time degrade the cellulose; and by different kinds of alkali treatment to adapt the pulp to any particular purpose.

Preparing the Pulp

It is obvious, from the above, that the manufacture of such pulps involves many different types of chemical reactions, where broad chemical control is necessary. This control has caused, with a certain justification, a feeling that the preparation of pulp in such mills is nothing other than a big laboratory experiment.

Actually only a relatively small part, about 5 per cent, of the world's total pulp production is used for chemical purposes. There is, however, reason to believe that this consumption will increase, perhaps not in proportion to other types of pulps, but nevertheless to a considerable extent. This belief is based on the fact that in the field of artificial fibres, such as viscose and acetate silk, where this pulp

finds its greatest use, there is, at present, a constant improvement in quality and, at the same time, a substantial decrease in manufacturing costs.

Considerable progress has been made regarding the use of by-products from pulp manufacturing. The most important of these has been the preparation of sulphite alcohol. The sugar content in the waste liquor, which is the starting point for this manufacture, costs practically nothing. The greatest cost factor is connected with the consumption of steam in distillation, and is relatively high, due to the waste liquor's low alcohol content after fermentation. It could, on the other hand, be reduced considerably by a combination of alcohol manufacture and the evaporation and burning of waste liquors.

Much work has been done in attempting to find the most favourable conditions for obtaining the highest possible alcohol yield on fermentation. Strangely enough, it has been found to be dependent in various ways on the waste liquor itself. Above all, it is a question of the acidity of the waste liquor during fermentation.

Without going into details, it can be said that waste liquor from the manufacture of dissolving pulp should be fermented at a considerably higher acidity than the lignin from "hard pulps." Further, it is of importance that fermentation should take place with the largest possible amount of yeast. This can be arranged, for example, by returning to the fermentation vat some of the yeast obtained from already fermented liquors by centrifuging.

Source of Many Products

The use of sulphite alcohol as a motor fuel is, in itself, a large topic and cannot be discussed in detail here. On the other hand, there is good reason to point out the importance sulphite alcohol has obtained as a raw material for the manufacture of many chemical products of great value, such as glycol, ethylglycol, butanol, acetic acid, chloroacetic acid, esters, acetaldehyde, etc.

In a few mills, the sugar content of the waste liquor has been used for the production of ordinary yeast, while several other mills have utilised these sugars for the production of fodder yeast. It is questionable whether or not this latter manufacture will be lasting, unless, as is the case in America to a certain extent, it becomes of primary importance to obtain a completely sugar-free liquor which is less harmful with respect to water pollution. Fodder yeast is, however, a highly valued product during times of crisis in countries having an insufficient protein supply.

The lignin sulphonic acid in the waste liquor has not, as yet, obtained any large scale use. Only small amounts are now used, for example, for the preparation of tanning agents or vanillin. Attempts are being made to utilise lignin sulphonic acid as soil improving agents, and for the production of ion exchangers and synthetic resins. The most important possible use would be to utilise lignin's basic phenylpropane character and to obtain from it, by new methods of decomposition, chemical products of diverse practical use.

An Old Problem

At present the considerably simpler question of utilising sulphite waste liquor as a fuel after evaporation is of great economic importance. This is an old question. Only during the last few years, however, has it advanced to the point where it may be considered solved from both the economic and technical point of view.

The great difficulty has always been the deposition of gypsum scales during the evaporation procedure. It now appears as if this difficulty can be overcome by suitable heat exchange in combination with pressure heating of the liquor during the intermediate stages.

After methods were found, by which it was possible to burn the concentrated waste liquors and to remove from the waste gases a large portion of their sulphurous acid content as well as their content of light gypsum dust, the problem of utilisation of sulphite waste liquor as a fuel could be considered solved. This implies, under the most favourable conditions, self-sufficiency with regard to fuel, or, under less favourable conditions, a reduction in coal consumption by at least half of that previously required.

With regard to the by-products of the sulphate industry, the most important progress has been made in utilisation of the so-called "tall-oil." The first practical results in the field were obtained in Finland and they were carried on here for a great many years before they were taken up by other countries. Those which should be particularly stressed, in this connection, are the improved methods of distillation and the separation of the fatty and resinous components. The first have found important usage in the manufacture of soap, and the latter, above all, in the sizing of paper.

In America attempts have been made to utilise the well-known method of precipitating lignin from black liquor with car-

bon dioxide. It has been found that this lignin product can be used as a thermoplastic material, together with different types of fibres or paper, for the preparation of hard plates and press board.

The saccharification of wood has always been of interest, but becomes during time of war or blockade, of vital importance. This is based, in some instances, on a necessity for a relatively cheap substrate for the fermentative production of alcohol or for the production of yeast, including fodder yeast, and in other instances, on a necessity for sugar.

There are, at present, two different methods for wood saccharification. The first is hydrolysis with dilute mineral acids at high temperatures, and the second, hydrolysis with concentrated hydrochloric acid.

Methods Compared

The first method is more appropriate if it is desired to produce alcohol exclusively. If, on the other hand, it is mainly desired to produce sugar, then the second method, in my opinion, deserves preference.

The alcohol here has to compete with sulphite alcohol, in which case, as was said before, the saccharification process does not cost anything. Since it is necessary to operate at low sugar concentrations in order to obtain a satisfactory alcohol yield, the distillation costs for the acid hydrolysis method will not be any lower than those in the sulphite alcohol process. It was probably this fact that caused a plant using the so-called Scholler method in the United States to close, while the newly started sulphite alcohol manufacture has apparently been able to compete with the other methods of alcohol production.

Sugar Production

The hydrochloric acid method is used in two German plants. In one, the sugar is used only for the preparation of fodder yeast with an annual production of about 6000 tons. In the other the main production is pure crystallised sugar with a present production rate of 500 tons per month. It is obvious that this method of refining constitutes a profitable procedure. In this connection the question can be raised as to whether sugar obtained from starch by a similar production method, usually called dextropur, can be produced more cheaply than wood sugar.

Another field that might be included under chemical wood utilisation is the destructive distillation of wood. This once flourishing industry has declined sharply since charcoal has found less and less use in the manufacture of iron. This decline will probably continue and it is very possible that the industry will cease altogether.

On the other hand, it should be pointed out that wood tar, especially that obtained from tree stumps, was found during the blockade to be a valuable raw material for, above all, the preparation of lubricating oil. Wood tar oils have, furthermore, found use during the war in hot bulb ignition motors. The other chemical by-products, acetic acid, acetone and methanol, have lost their previous market. Attention should be drawn, in this connection, to the fact that generator gas, prepared from charcoal, was found, during the blockade, to be a life saver for motor traffic.

In conclusion it may be stated that chemistry's part in the different wood utilisation processes has become more and more important and, in certain cases, has dominated all else. Future development must more and more be concentrated on qualitative improvements rather than quantitative expansion, due to the insufficiency of the world's wood supply. Under these conditions we can say with certainty that chemistry will improve upon its already important position in the field.

Low-Pressure Liquid Methane

THE great development of the production of methane gas in Italy—130 million cu. m. last year and probably 300 million cu. m. this year—has intensified the problem of transporting this fuel. The network of pipe-lines is growing; there were 35 miles of such pipe-lines in 1939, while today there are 450 miles, and in 1952 this figure will have been increased to 975 miles. Pipe-lines, however, do not generally reach individual consumers and the traditional method of using steel containers resisting a pressure of some 175 atmospheres limits widespread economical use. There are, moreover, only some 150,000 such containers in the country.

One solution is to liquefy the gas. The early procedure of the German technicians required compressing the gas at 200 atmospheres. Later, French scientists accomplished the liquefaction at 40 atmospheres. It is now announced that Italians have succeeded in liquefying methane at the pressure of only 8 atmospheres, and it is thought that this may be further reduced. Every cubic metre of liquid methane represents some 600 cubic metres of gas.

Technical Publications

VIBRATIONS in engineering and torsional problems are the subject of a general survey by R. G. Manley in *Torque* (*1*, 2), the September issue of the Development Journal of Silentbloc, Ltd., and the Andre Rubber Co., Ltd. Among other articles James Lawrie (British Rubber Development Board) deals with "Rubber Linings in Pipes and Tanks," and the Marconi Electroencephalograph is described.

* * *

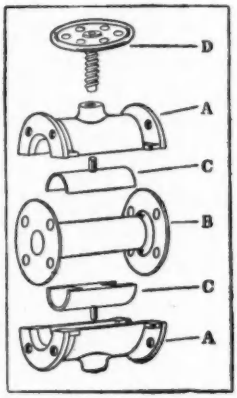
VARIED uses of Monel, showing its application to such diverse subjects as foundry practice, bee-keeping, oil and petrol strainers, laundry equipment, food containers and water distillation are described in illustrated articles in the August issue of "Wiggin Nickel Alloys" (formerly "Monel Notes"), issued by Henry Wiggin & Co., Ltd., Birmingham. Other features deal with the use of Inconel, cupro-nickel and thermometals.

* * *

TWO types of direct-reading dynamic electrometer—a millivoltmeter for laboratory measurements and a dosimeter for X-rays—are described in an article by J. van Hengel and W. J. Oosterkamp in *Philips Technical Review* (Vol. 10, No. 11), now available from Philips Electrical, Ltd., London. Other features include a system for the circuiting of fluorescent lamps in coal mines, which precludes the risk of explosions, and abstracts of recent scientific publications of the N.V. Philips' Gloeilampenfabrieken.

* * *

WITH his tools in daily use in subjects as far removed as neurology and radar the modern electrical engineer may be forgiven if he boasts that he can measure anything from a flight of fancy to the flight of a shell. It is fitting, therefore, with the meeting next month of the British Association, which has always encouraged electrical measurement, that the current number of *Technique* (Vol. 3, No. 3), published quarterly by Muirhead & Co., Ltd., should devote its introduction to the advancement of science and its articles to commonplace unspectacular laboratory instruments that have contributed in no small measure to that advancement. Subjects include: "The Owen Bridge for Testing Magnetic Materials"; "The Frequency Bridge," and "Universal Units."



A simple valve for chemical uses, providing a full bore and a passage for liquids unimpeded by glands or pockets. One stock range is said to be capable of use with most gases and liquids (Warren, Morrison, Ltd.)

THE problem of keeping abreast with latest medical and chemical developments in veterinary science is facilitated by the periodical issue of a series of pamphlets by Evans Medical Supplies, Ltd., Speke, Liverpool. Two new publications are "Medical Products of Interest to the Veterinary Profession," and "Procaine Penicillin Intramammary Injection for the Treatment of Bovine Mastitis," while reprints include Hæmorrhage septicæmi and Fowl Cholera Serum and Vaccine; Calcium Borogluconate for hypocalcæmic diseases, and Tetanus Antitoxin.

* * *

"GERMAN Steel at the Cross Roads" is the subject of the main article in the *Monthly Statistical Bulletin* for July (24, 7), published by the British Iron and Steel Federation. It is also announced that coloured charts (20 in. by 30 in.), which have appeared in recent issues of the *Bulletin* may now be obtained as follows: Steel Production, 1948; Margins of Firms for Home Deliveries of Certain Products; British Iron and Steel Federation; U.K. Steel Production and Capacity; U.K. and World Steel Consumption; Proportion of Iron and Seel Industry to be Nationalised.

AMERICAN CHEMICAL NOTEBOOK

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From OUR NEW YORK CORRESPONDENT

PLANS for introduction in England of the low-pressure air conveyor system developed by the Convair Corporation of Pittsburgh, Pa., have been announced by the company. The Convair system, developed during the past four years and claimed to permit an exceptionally large ratio of product to air volume, will be a feature of the new plant of Jackson Brothers, Ltd., bottle manufacturers, at Knottingley, England. In this factory, glass batch and all raw materials will be carried by low pressure air. Jackson Brothers previously made a successful trial of the system in another plant. Mr. J. Bozich, president of the American firm, is now in England and is expected to license the Convair system to British manufacturers serving the ceramic and coal industries. The system uses balanced pressure to saturate the air stream completely with the conveyed material.

* * *

Owned by the U.S. Government, to whom it was assigned by the inventors, Henry H. Storch and Lester L. Hirst, U.S. Patent No. 2,464,271 (March 15, 1949), covering liquefaction of coal by hydrogenation, has been made available by the Department of the Interior on a non-exclusive and royalty-free licence basis. The process relates to production of fuel oil from coal. The latter is mixed with a liquid vehicle and a dispersed catalyst is heated to at least 300°C. and introduced, together with excess hydrogen, into a closed reaction zone maintained under an elevated pressure of not more than 90 atmospheres. The temperature is progressively raised to a final range of not more than 475° C.

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A relatively new anti-malarial insecticide, known as "Pamisc," stated to contain 75 per cent DDT, has been developed by the Pennsylvania Salt Manufacturing Company, Philadelphia, Pa. Besides providing uniform suspensions, it is claimed that this insecticide has eliminated the problem of the obstruction of spray nozzles, stated to have been a difficulty with ordinary wettable powders. Large quantities have been supplied to Venezuela, where it is said to have been used very effectively, its high concentration considerably easing the difficult transport problems involved there.

Construction of five new plants to process powdery iron ore to usable size and to recover iron from blast furnace flue dust is to be undertaken shortly at strategic centres by steel producing subsidiaries of the United States Steel Corporation. Completion of the new facilities will add some 1.8 million tons net to the high grade iron ore annually available for United States Steel blast furnaces without requiring an equivalent increase in iron mining. Large sintering plants of advanced design will be built at the Gary, Indiana, and South Chicago, Illinois, plants of the Carnegie-Illinois Steel Corporation, as well as at the Edgar Thomson and Carrie Furnace plants of that company in the Pittsburgh district. A fifth sintering plant will be installed at the National Works of National Tube Company at McKeesport, Pennsylvania. The new sintering plants will recover the substantial quantities of iron values present in flue dust and sludge recovered from the dust catchers and gas washers, respectively. Flue dust has an iron content of approximately 50 per cent. The importance of these facilities is apparent in the fact that over a period of ten years a metal loss of approximately 3 million tons is attributed to the neglect of fines in iron ore.

* * *

Large-scale production of the rare gases krypton and xenon by Linde Air Products Company, a unit of Union Carbide and Carbon Corporation, has brought about price reductions sufficiently large to encourage wider use of the hitherto expensive gases. Krypton in the atmosphere represents about one part in one million, and xenon one part in 12 million. Their separation and purification have presented complicated problems. It is expected that many diverse products and processes may now be improved by using xenon and krypton. Nitrogen users are expected to investigate the advantages of the rare gases, since they are inert and will not combine with other elements under any conditions while nitrogen (although considered inert) will unite with many elements at high temperatures. Xenon and krypton also have lower electrical resistance, lower thermal conductivity and lower ionising potentials than argon, the most widely used rare gas.

HOME

Chemistry of Oils and Fats

A course of 12 post-graduate lectures on the modern chemistry of oils and fats is to be held at the Acton Technical College, London, W.3. The course will be held on Friday evenings at 7.30 p.m., beginning September 23, the fee being one guinea.

Coal Output

Production of coal in Britain last week showed a total increase of 61,000 tons over the previous week. Comparative figures are:—Last week: 4,014,000 tons (3,752,000 tons deep-mined, 262,000 tons opencast). Previous week: 3,953,000 tons (3,706,000 tons deep-mined, 247,000 tons opencast).

Industrial Finishes

The first exhibition to be devoted to displaying the high standard of finish achieved in British goods is planned to be held at Earls Court, London, in September next year. A scientific congress on industrial finishing is to be held at the same time as the exhibition.

Visit to Lavender Distilleries

An enjoyable outing to Hunstanton, Norfolk, was made recently by 18 members of the Royal Institute of Chemistry (London and South Eastern Counties section) when they visited the 50-acre lavender field of Yardley & Co., Ltd., and watched the process of steam-distillation which is carried out within 48-hours of cutting the lavender.

Electronics and Industry

A symposium on the application of electronics to research and industry, sponsored by the electronics section of the Scientific Instrument Manufacturers' Association will be held at the Examination Hall, Queen's Square, London, W.C., from Wednesday to Friday, November 2-4. Besides the technical papers and discussions there will be a display of the latest types of British scientific and electronic instruments.

Scottish Lead Mining

Lead mining has been revived in Kirkcudbrightshire near Newton Stewart. The country was at one time a rich mining area until large scale overseas production brought about a decline in the mining industries carried on in the Stewartry at many points on the river Cree. Reserves are not equal to continuous operation, but, while prices are high and supplies from home sources limited, the present activity is profitable.

Iron from Calcutta

The steamship *Indian Shipper* last week discharged at Newport, Monmouth, 3296 tons of machine-cast pig iron, the first post-war consignment from Calcutta, for the Richard Thomas and Baldwins works at Ebbw Vale and Panteg.

Polythene Equipment for Poland

The Polish Government has ordered nearly £4000 worth of polythene tubing and fittings from Tenaplas, Ltd., extruded plastics manufacturers, of Upper Basildon, Berks. It is understood that the piping will be used in a vinegar-making plant.

Sir George Beilby Awards

The administrators of the Sir George Beilby Memorial Fund, the Royal Institute of Chemistry, Russell Square, London, W.C.1, have invited notifications of work of exceptional merit in fuel economy, chemical engineering or metallurgy which may qualify for a memorial fund award in 1950.

Savings in Industry

The chemical industry is rated fifth among the groups with highest percentage of industrial savings in concerns employing more than 500 people. According to figures issued by the National Savings committee, average savings per group member in the larger concerns of the chemical industry for the June quarter were £3 19s. 5d.

Research Scholarships

The Pharmaceutical Society's research scholarships for 1949 have been awarded as follows: *The Pharmaceutical Society Scholarship*—Mr. B. K. Martin, B.Pharm., at Nottingham University. *The Ransom Fellowship*—Mr. R. A. Webb, B.Pharm., B.Sc. (Hons; special chemistry), at the School of Pharmacy, University of London.

Overseas Standards Recorded

It appears that it is not sufficiently well known that the British Standards Institution acts as the agent in the United Kingdom of all overseas national standards organisations. At the present time, when every possible avenue for export is being explored, many concerns write directly to standards organisations abroad only to be referred to the BSI, to whom, it is suggested, application should be made, at 24/28 Victoria Street, London, S.W.1, for all information regarding standards, both home and overseas.

· PERSONAL ·

MORE than 700 members representing 42 countries attended the first International Congress of Biochemistry held at Cambridge this week. Among the distinguished members on whom honorary degrees were conferred at a special Congregation in the Senate House were: LORD ADDISON, Lord Privy Seal; PROF. C. F. CORI, of Washington University School of Medicine, noted for his work on enzymes and on insulin; SIR CHARLES HARINGTON, director of the National Institute for Medical Research, for his investigations on thyroid glands; DR. KAJ LINDERSTROM-LANG, for whom the Carlsberg laboratory, Copenhagen, was founded in appreciation of his work; PROF. ARNE TISELIUS, of the Royal University of Uppsala, and DR. JACQUES TREFOUEL, director of the Pasteur Institute.

The Priestley Medal of the American Chemical Society has been awarded to DR. ARTHUR B. LAMB, of Harvard University, who for 30 years has edited the *Journal of the American Chemical Society*. Dr. Lamb is to receive the medal at the society's 116th national meeting this Autumn, and will retire from his editorial post at the end of the year.

MR. LESLIE MCARD, Lytham St. Annes, managing director of Robert McArd & Co., Ltd., plastic moulders, Crown Point, Denton, Manchester, left £131,292 (net £122,126).

DR. IRVING M. KLOTZ, 33-year-old Illinois chemist and associate professor of chemistry in North-western University, whose pioneer research on proteins may help explain the basic effectiveness of sulpha drugs and similar biochemicals, will receive the $1000 Eli Lilly & Company award in biological chemistry at the 116th national meeting of the American Chemical Society, which opens in Atlantic City, New Jersey, on September 18. His recent work has been devoted to analysis of the bonds linking proteins to other substances, and an incidental result of these studies has been new insight into the molecular patterns of the proteins themselves.

The Textile Institute has awarded a £1000 Open Scholarship to GEOFFREY ROBERT HAINES, aged 19, of Redditch, Worcs. This is the first such scholarship offered by the institute to young persons in any section of the textile industry and to senior students in their final year at school. The successful candidate was selected from a list of more than forty applicants. The award will enable Mr. Haines to take a degree course in Textile Engineering at Manchester College of Technology. A further £750 Cotton Industry War Memorial Trust Scholarship—the seventh such—has been awarded by the Institute to JOHN CLIFFORD HILTON, aged 21, Chorley, Lancs. He will complete preparatory studies at the Preston Harris Institute before taking a degree course at Manchester College of Technology in October, 1950.

Members of the Pharmaceutical Society recently held a dinner in London to celebrate the 80th birthday of their colleague, MR. A. R. MELHUISH. Among those who paid tribute to him, were Mr. H. Clement Shaw, president, Mr. H. N. Linstead, joint-secretary, and Mr. Rupert Woolby Brooke, chairman of the West London branch of which Mr. Melhuish is a member.

CAPTAIN T. H. THORNEYCROFT has tendered his resignation from the office of deputy chairman of the Scottish Divisional Coal Board with effect from the end of this month. He is taking up an appointment outside the coal industry.

VISCOUNT LEVERHULME has been appointed advisory director of Lever Brothers and Unilevers, Ltd.

Chemical Society Grants

THE Research Fund of the Chemical Society provides grants for the assistance of research in all branches of chemistry. About £700 per annum is available for this purpose, the income being derived from a donation of the Worshipful Company of Goldsmiths, from the Perkin Memorial Fund, and from other sources. Applications for grants will be considered in November next and should be submitted on the appropriate form not later than Tuesday, November 1. Applications from Fellows will receive prior consideration. Forms of application, together with the regulations governing the awards of grants, may be obtained from the general secretary, the Chemical Society, Burlington House, Piccadilly, London, W.1.

OVERSEAS

U.S. Steel Mill for Jugoslavia

President Truman has given instructions for Jugoslavia to be permitted to purchase from the U.S.A. a $3 million (£750,000) steel finishing mill. The purchase will be made from a private American firm.

Strike Violence

Street brawls, smashed windows and overturned motor cars occurred during the strike of members of the United Chemical Workers, CIO, at the plants of the National Carbon Co. Most strikers have returned to work after 77 days and there have been some dismissals.

British Plastics Plant for Australia

Plant and equipment from Great Britain will be used by one of the largest plastics manufacturers in Australia to equip a factory at Adelaide controlled by the South Australian Government. The factory was formerly used as a distillery, and was purchased by the State Government from the Australian Government for £A105,000.

Malaya Development Grant

A free grant of £121,786 from the Colonial Development and Welfare Fund to the Federation of Malaya has been approved by the Secretary of State for the Colonies. A five-year scheme will enable selected young men from small-holding areas to be trained at the experimental station of the Rubber Research Institute.

Commercial Alcohol in Canada

Sales of Commercial Alcohols, Ltd., Montreal, are currently 18 to 20 per cent higher than a year ago shareholders were told at the annual meeting. Mr. C. G. Kertland, president, said that the Gatineau (Quebec) alcohol plant had attained a 60 per cent operating rate, and operation at full capacity was expected by the end of September or October.

Swiss Exports Declining

Switzerland's exports of chemical and pharmaceutical products, dyes and perfumery, amounted to 239.9 million Swiss francs in the first half of the current year, compared with Fr.250.8 million in the corresponding period of last year. Export of aniline dyes and indigo fell from Fr.119.9 million to Fr.100.4 million, shipments of industrial chemicals declined Fr.40.6 to Fr.34.3 million, but sales abroad of pharmaceutical products rose from Fr.78.7 to Fr.93.2 million and those of perfumery from Fr.11.6 to Fr.12 million.

Argentina Penalises Shell Mex

A decree requiring Shell Mex of Argentina, a subsidiary of the Shell group, to pay a fine of 1,489,550 pesos was published in Buenos Aires, last week. The fine is imposed for alleged violations of the exchange control regulations of 1938.

Scientific Film Centre in Italy

A centre of scientific cinematography has been established at Polytechnicum in Milan, where the application of films will be studied as an aid to teaching and culture, scientific research, technical documentation, and industrial and architectural research.

Dead Sea Potash Works to Reopen

The potash works at the southern end of the Dead Sea which have been guarded by an Israeli garrison since the end of the British mandate in May last year, were this week handed back to the British owned Palestine Potash Co. The plant is intact, but transport difficulties may delay the resumption of operations.

Crude Oil Output in U.S.A.

A daily average of 4.723 million barrels of crude oil was being produced in the U.S.A. during the week ended August 13 according to the American Petroleum Institute. Daily average output in the previous week was 4.670 million barrels, and 5.507 million barrels in the same week of 1948.

International Pharmacy Conference

The 13th international conference of the Fédération Internationale Pharmaceutique is to be held in Amsterdam from August 28 to September 2. The foundation of this federation was originally due to the initiative taken by the Royal Dutch Society for Promotion of Pharmacology in 1909, and the statutes provide for the secretary and chairman (or vice-chairman) to be Dutch.

Monsanto in Australia

Monsanto Chemicals, Ltd., announces that the name of its Australian associated company has been changed to Monsanto Chemicals (Australia), Ltd. The company, formerly Monsanto (Australia) Pty., Ltd., was converted into a public company at a meeting of shareholders recently held in London. Monsanto Chemicals, Ltd., London, holds the majority of the ordinary stock of the Australian company, and Monsanto Chemical Co., St. Louis, also participates.

Italy Plans Large Supplement of Synthetic Nitrate

Fruitful Use of Low-Grade Sardinian Coal

AN important Italian enterprise, consisting in the further development of the important Sulcis coalfield in Sardinia, the establishment of a large thermo-electric power station, and manufacture of synthetic nitrate, was recently described by Prof. M. G. Levi at a meeting in Rome. (*La Chim. et l'Ind.*, 1949, *31* (7), 242-244.) The author is president of the Azienda Carboni Ital. (A.C.I.), which is mainly concerned in the enterprise through its affiliates.

The extent of the coal resources here is estimated at more than 500 million tons, although it is not of the highest quality. Some account is given of the coal mining and of the important town of Carbonia which has sprung up in the neighbourhood.

Economic Use of Smalls

A special problem in this particular field is the very large amount of " smalls " produced, amounting to at least 50 per cent of the total. It is now proposed that these large quantities of small coal should be gasified by modern methods, with prior recovery of the sulphur content, with a view to the manufacture of synthetics, especially nitrates.

In 1939, Italian output of nitrogen was about 154,000 tons, corresponding to nearly 790,000 tons of fertiliser. Production subsequently declined considerably, but by 1948/49 it had recovered to about 125,000 tons of nitrogen.

The Marshall plan, in respect to Italy, anticipates for 1950/51 and solely for home use a production of 180,000 tons of nitrogen, to be increased in succeeding years. Hydrogen is, of course, also required and is at present produced in Italy mainly from coke-oven gas, an insufficient and not very satisfactory source.

On these and other grounds this new Sardinian scheme is of great national importance, and should have, among others, the following basic features: To be sufficiently large for an output of at least 50,000 tons of nitrogen per annum; be situated near the sea, *e.g.*, at S. Antioco or Porto Vesme; production of hydrogen by gasifying the Sulcis small coal with oxygen and steam; a thermo-electric power plant using the Sulcis smalls.

A Winkler or Koppers plant is proposed for gasifying, together with sulphur recovery. This sulphur could be used for direct conversion into sulphuric acid and ammonium sulphate. It is proposed in the first place to fix two-thirds of the nitrogen as ammonium sulphate and one-third as calcium nitrate, as being most in demand, but later, and especially with a view to export, other and more concentrated fertilisers, such as ammonium nitrate and urea, would be manufactured.

For an annual production of 160,000 tons of ammonium sulphate and 110,000 tons of calcium nitrate, about 160 m. kWh would be required (3.25 kWh per kg. of nitrogen), necessitating 115,000 tons of small coal for the power station, 135,000 tons of coal for the gasifiers, 93,000 tons of pyrites, and 66,000 tons of limestone. The total cost is estimated at 18,000 m. lire. About 1500 workmen and 160 chemists, executives, etc., would be employed.

The above figures, such as power and coal requirements, may probably be increased to provide for reserves and other contingencies, including future expansion. Various economic and national considerations are discussed by the author at some length, as having already been placed before the special commission appointed by the Government.

Natural Resources of Canada

UTILISATION of the natural resources of Canada will be discussed in a series of papers to be given at the regional meeting of the American Institute of Chemical Engineers to be held in Montreal from September 6-9.

Conferences of the institute, the largest organisation of chemical engineers in the world, are rarely held outside the U.S.A., and it is 12 years since the last meeting in Canada.

The potentialities and development of water power in Canada will be discussed by Mr. Huet Massue, of the Shawinigan Water and Power Co. Dr. J. R. Donald, of Montreal, will deliver a paper on the Alberta resources in relation to the chemical industry.

" The Economic Significance of Newfoundland as a Province of Canada " will be discussed by Mr. Alvin S. Townshend, and Mr. P. E. Radley will describe the Canadian aluminium industry.

About 400 engineers and executives from all parts of the U.S.A. and Canada will take part.

VEGETABLE OILS OF SOUTH AFRICA

Problems of Cost and Production

AN investigation into tung oil production costs has been ordered by the South African Division of Economics and Markets. It will begin immediately and may result in the introduction of tung oil pressing in the Union. The Eastern Transvaal Highveld, Eastern Natal and Swaziland are the chief producing areas. There are about 300,000 tung trees in South Africa and 175,000 in Swaziland. Total production amounts to about 275,000 tons a year, which is not enough to supply the Union's requirements, so that at present it is necessary to import additional supplies.

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Such a glut of oil nuts is now reported in the Union that an approach has been made to the soap makers to employ some of the surplus in their manufactures. The big price gap between oils and fats derived from groundnuts and sunflower seeds and the customary tallow, whale oil and palm kernel oil has, however, made this impracticable and the Union Government is now faced with the unpleasant alternative of exporting surplus oil from groundnuts to world markets at prices probably far below those outside the Union.

The position in the Union is further complicated by Rhodesian growers. Whereas the guaranteed price for groundnuts to South African farmers is £58 10s. a ton, in Southern Rhodesia the price is £34 a ton. This results in a cost of edible oils to Union expressers of £143 a ton against a cost just across the Limpopo river of about £83 a ton. Since this Rhodesian oil is subject to only 10 per cent customs duty, it follows that, under the present tariff agreement and a guaranteed price arrangement for farmers inside the Union, imported oil from Rhodesia can undersell the local product by no less than £52 a ton. Drought in Southern Rhodesia has so far saved the situation, but a normal crop there could be upsetting for the Union.

* * *

The view that the tsetse fly might be eliminated from the Union by the end of the summer of 1950, provided the Government continued its present support and if farmers in the infected areas would continue to co-operate, was expressed by the Director of Veterinary Services in his presidential address to the annual meeting in Kimberley, of the South African Association for the Advancement of Science.

Phenomenal results had been obtained, he claimed, by the application of DDT and BHC in the 7000 sq. miles of fly-belt in South Africa. Reviewing recent advances in the veterinary and medical fields, he said that much progress had been made in the study of horse sickness, blue-tongue and foot-and-mouth disease. There was a strong suspicion that the foot-and-mouth disease virus was propagated in certain species of game between outbreaks of the disease in cattle. Significant advances had been made with the sulpha drugs in controlling infectious diseases, and new drugs were being evolved for the treatment of malaria in humans.

* * *

United Vermiculite and Base Minerals, Ltd., Victory House, Harrison Street, Johannesburg, is marketing vermiculite under the trade name of Verolite. This concern is mining and producing cleaned and graded vermiculite for export. A percentage of the output is being exfoliated for local use where the demand is expanding.

* * *

Union Liquid Air Co. (Pty.), Ltd., 11-15 Loveday Street Extension, Johannesburg, has been formed with a capital of £250,000 to make oxygen and dissolved acetylene and other compressed gases. The company has acquired a two-acre site in Germiston, where a factory is being erected. It has also taken over a two-acre site in Durban to build a similar factory. The local company is associated with the Canadian Liquid Air Co., of Montreal. A post-war investigation of the local market revealed that the prospects for manufacture were favourable. Oxygen and dissolved acetylene will be the company's two main lines and the calcium carbide for the acetylene will be produced in the Union. At Germiston such medical needs as nitrogen, compressed air and oxygen will be produced. The factories are being fully mechanised and much of the plant and the bulk of the capital is of Canadian origin.

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The specification for salt issued by the S.A. Standards Institution in 1943 has been revised to include many improvements brought to light as a result of prac-

(*continued overleaf*)

CHEMICALS IN CEYLON AND INDIA

Export Prospects for Oils

From OUR SPECIAL CORRESPONDENT

VEGETABLE oils all over the world have declined considerably in price and the Government of Ceylon cannot hope to continue getting the prices for coconut oil it received in 1948, according to Mr. V. C. Axworthy, managing director of the British Ceylon Corporation, Colombo. There will definitely be a market for Ceylon coconut oil, he said, but at a limited price. The United Kingdom, he considered, would be prepared to enter into a further contract with Ceylon on the same terms as the existing one, buying at Rs.1021-75 per ton in bulk, FOB, but it was doubtful if this would be continued for a long period.

Increased demands from abroad have resulted in the price of Ceylon citronella oil rising sharply from Rs.2-30 per lb. to Rs.2-65 within the last few days. The average price last year was Rs.1-99 per lb. The 1946 Ceylon citronella oil fetched Rs.5-18 per lb. and in 1947 the average was Rs. 3-17 per lb.

Pakistan's heavy chemical industry, which has been paralysed to a great extent after the establishment of the new Dominion, is rapidly recovering.

The Central Government proposes to install plants for the production of one ton daily of sulphuric acid at Chittagong, the West Punjab, Karachi and the North West Frontier Province. These four plants are expected to be in operation by the end of 1950, and would produce about 1500 tons of pure acid required for industries.

In addition, the Government has approved the setting up of three "contact" plants in Western Pakistan, which will be in operation by the end of this year. The question of setting up a similar contact plant in East Pakistan is also under consideration by the Government.

With the establishment of sulphuric acid and synthestic ammonia plants, the manufacture of nitric acid is expected to present no difficulty. Requirements of hydrochloric acid would be met as a by-product in the process of manufacturing electrolytic caustic soda.

A plant to produce 70 tons of soda ash daily is working in Western Pakistan, as against the annual requirement of 12,000 tons. The Government of Pakistan will authorise the export of 8000 tons of soda ash to foreign countries.

Mr. B. S. Lalkaka, chairman of the Indian Chemical Manufacturers' Association of Bombay, referred to the various difficulties, which the spirituous products industry had to face and the several restrictions imposed by the Government of Bombay on their sale and transport.

He deplored the unhelpful attitude of the Government towards the development of the industry. India, he added, possessed nearly 75 per cent of the world's barks, herbs, gums and roots, which offered excellent scope for developing spirituous products and perfumery.

VEGETABLE OILS IN SOUTH AFRICA

(*continued from previous page*)

tical experience, particularly in regard to the presence of trace elements in table and dairy salts and the effect of impurities in salt used for curing hides and skins. The revised edition of the specification which has been published on behalf of the S.A. Standards Institution by the Standards Council has been declared a S.A. Standard Specification.

The specification classifies salt according to its uses into three main groups, broadly, for industrial use; as a foodstuff; and as a preservative. The committee responsible for drawing up the specification considered that the salt industry in the Union could derive great benefit from standardisation and its application to quality. Copies of the specification, No. SABS 12-1948 are obtainable at 5s. each, post free, from S.A. Bureau of Standards, Pretoria.

* * *

While benzol is produced in the Union, mainly by the S.A. Iron and Steel Industrial Corporation, Ltd., supplies are not sufficient to meet all local requirements. Thus there has been no objection to the application by Klipfontein Organic Products for an extension of the rebates of customs duty on benzol to make benzene-hexachloride concentrate, which is now produced locally on a large scale.

GERMAN IRON AND STEEL

Survey of Wartime Developments

FOR some time the iron and steel industries of the United Kingdom and the U.S.A. have been pressing for a detailed and comprehensive work of reference on development and progress in German ferrous metallurgy during the war years, when all international exchange of scientific and technical knowledge was suspended. This need, says a Board of Trade note this week, is now being met by the publication today of the BIOS Overall Report No. 15: "The Ferrous Metal Industry in Germany During the Period 1939-1945" by Geo. Patchin, formerly principal of the Sir John Cass Technical Institute, London, and Ernest Brewin, intelligence officer of the British Iron and Steel Federation.

The German iron and steel plants were inspected between November 1944, and May 1947 by some 120 teams of British and American experts, each team issuing its own specialised report. In all, over 400 reports have been published by HMSO, and an imposing mass of foreign language documents has been accumulated in this country.

Pre-War Comparison

In this volume the large number of reports are correlated and condensed, to afford an exhaustive summary of the devlopments in the industry, surveyed from all angles. The volume is in nine sections: Blast furnace plant and practice; Steelworks plant and practice; Mechanical treatment; Foundry practice; Steels, ferro-alloys, hard metals; Heat treatment; Cutting; Joining, repairing, fastening; Coatings (including cladding and bonding); Research and testing. Critical analysis and comparisons of pre-war and wartime practice are given, deviations from British and American practice, with their resulting advantages or disadvantages, are stressed; trends, induced by material shortages or by availability of new alternative materials or processes, are recorded; and the possibility of future application of war-time innovations is discussed. A section on research shows the close link between German investigators and the industries concerned and surveys the iron and steel research centres, reviewing their specialised work. An appendix to each section gives full reference to the original reports surveyed and there is a comprehensive index. The volume of 270 pages, costs 4s. 6d.

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INSTITUTE OF METALS

Autumn Meeting in Paris

THE first meeting of the Institute of Metals to be held outside the British Isles since 1936 will be the 41st annual autumn meeting, which will be held in Paris and the surrounding neighbourhood from Monday, October 3, to Wednesday, October 12.

This has been made possible by the invitation of the Société Française de Metallurgie and the French Non-Ferrous Metal Industries, and members will be welcomed by an influential reception committee with M. le Géneral Nicolan, président de la Société Française de Métallurgie, chairman, and M. Eugène Dupay, honorary secretary.

At the same time, and in the same building, the annual meeting of the Société Française de Métallurgie will be held, and these two conferences will provide excellent opportunities for French, British and other members to meet. Care will be taken that the non-ferrous sessions of both societies do not clash. The meeting of the Société Française de Métallurgie will open at 10 a.m. on Monday, October 3, when Dr. R. Seligman will deliver an address in French. Members of the Institute are invited to be present.

The Institute meeting will be in two parts, the first taking place in Paris from Monday, October 3, to Saturday, October 8, and the second from Sunday, October 9, consisting of tours outside the Paris area.

Among the interesting papers are: "Recent French Work in the Field of Light Alloys," by Prof. Georges Chaudron; "Some Effects of Silicon on the Tendency to Cracking in Aluminium-Copper-Magnesium Alloys of High Purity," by W. I. Pumphrey and D. C. Moore; "Segregation and Liquidation in Alloys and their Application to Non-Ferrous Metallurgy," by A. M. Portevin and M. Dannemuller.

The programme also includes an informal conversazione in the Maison de la Chimie, banquet at the Cercle Interallié, and visits to the laboratories of the Centre National de la Recherche Scientifique, Bellevue; Centre Technique de l'Aluminium, and attendance at the Osmond Centenary ceremony at the Sorbonne, at which the President of the Republic will be present.

Coke Output in Canada

Production of coke in Canada from ovens and gas retorts in May totalled 348,000 tons compared with 336,000 tons in April, and 327,000 tons in May, 1948.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgage Satisfactions

HOWARD-PRICE, LTD., Lincoln. (M.S., 27/8/49.) Distillers of tar, etc. Satisfaction July 20, of debentures registered March 26, 1936.

KENT CHEMICAL CO., LTD., Tenterden. (M.S., 27/8/49.) Satisfaction July 14, of charge registered Oct. 6, 1945.

RICHARD THOMAS & BALDWINS, LTD. (formerly RICHARD THOMAS & CO., LTD.), London, W. (M.S., 27/8/49.) Steel tinplate, etc., Manufacturers. Satisfaction July 22, of debenture stock registered July 19, 1937, to the extent of £335,816.

Company News

Bush, Beach & Gent, Ltd.

At an extraordinary general meeting at which it was agreed to increase the capital from £20,000 to £50,000 it was announced that a bonus issue of 10,000 fully-paid £1 ordinary shares and 10,000 fully-paid £1 5 per cent non-cumulative preference shares would be made. One ordinary and one £1 preference share will be allotted in respect of each £1 ordinary share held at June 30, 1949.

C. & E. Morton, Ltd.

The 37th annual report for the year ending March 31, 1949. Net profits £92,179 (£120,588). Dividend on 7 per cent preference £15,400 (same); ordinary (interim 25 per cent), £61,875 (£94,050).

Standard Oil (New Jersey) Affiliates

Consolidated earnings of the company's affiliates for the six months ended June 30, 1949, after all charges, are estimated to be $137.1 million ($210 million) or $4.54 per share ($7.5) on 30,183,394 shares outstanding on that date. The earnings reflect both reduced operating rates and lower average prices.

Veno Drug Co., Ltd.

Twenty-fourth annual report, for the year ended March 31, 1949. Net profit £160,612 (£161,651). Dividend on 8 per cent preference £13,200 (same); 12 per cent preferred ordinary £18,150 (same); deferred ordinary (1s. per share) £107,250 (same).

New Registrations

Plant Productivity, Ltd.

Private company. (471,643). Capital £1000. Agricultural research workers, industrial chemists, chemical research specialists. Directors: R. F. Milton, and W. A. Stephenson. Reg. office: 24 Welbeck Way, W.1.

Private company. (471,958). Capital £50,000. Objects: To acquire the business of paint manufacturers carried on by G. Wadsworth & Son, Ltd., at Beddington Lane, West Croydon. Directors: G. Wadsworth and J. Wadsworth. Reg. office: 47 Victoria Street, S.W.1.

Private company. (471,833). Capital £7500. Objects: To acquire the business of manufacturers of detergents and other similar products carried on by H. A. Tappin and B. E. Tappin. Directors: H. A. Tappin, B. E. Tappin and E. Poole. Reg. office: 22a Green Lane, Penge, S.E.20.

Increases of Capital

The following increases in capital have been announced: THE LONDON FUMIGATION CO., LTD., from £1000 to £20,000. SIDNEY R. LITTLEJOHN & CO., LTD., from £10,000 to £35,000.

Partnership

Dr. R. F. Paget and his chemical and engineering associates, of Barwick in Elmet, Leeds, have established a partnership to facilitate the wider operation of their service as chemical engineering consultants and suppliers of specialised chemical plant.

Rayon Plant for Australia

REPORTS from Australia state that Courtaulds will probably announce in London shortly its project to establish a large rayon factory at Tomago Sands, near Newcastle, N.S.W. It is expected to cost about £5 million.

A senior representative of Courtaulds has been in Australia for some weeks working on plans for a 900-acre site. Difficulties of water supply are now said to have been overcome and the arrangement of facilities has been the subject of lengthy negotiations between Courtaulds and the Federal and State Governments. The plant is expected to employ about 4000.

Chemical and Allied Stocks and Shares

STOCK markets have continued to mark time, awaiting the outcome of the Washington financial talks. British Funds, however, have been firmer, apparently because of the growing belief that in any case Sir Stafford Cripps will not agree to devaluation of sterling. Industrial shares have also shown a firmer trend, although in most cases price movements were small.

Among shares of chemical and kindred companies, Borax Consolidated deferred were good, up to 53s., being in favour because of the company's important assets and earnings in the U.S.A. Imperial Chemical have been steady around 41s. 9d., Dunlop Rubber firmed up to 61s. 3d., and Lever N.V. to 44s. British Oxygen have been more active around 93s., British Aluminium 42s. 9d., and Turner & Newall 74s. 9d.

Shares of metal dealing companies were more in evidence, partly because it is believed that, in the event of devaluation of sterling, re-opening of the London Metal Exchange would quickly follow. Amalgamated Metal shares firmed up to 18s. and Metal Traders rose to 46s. 3d., although the advance in the latter was attributed to expectation of the results creating a good impression and to talk of a share bonus.

Laporte Chemicals 5s. ordinary were 20s. 9d., Boake Roberts at 28s. 9d. were unaffected by the full financial results, and Brotherton 10s. shares were 19s. 6d. Albright & Wilson eased to 27s. 3d., Amber Chemical 2s. shares were 4s., F. W. Berk 2s. 6. ordinary were 12s. 6d., and Bowman Chemical 4s. shares 6s. 9d. Monsanto Chemicals have changed hands around 49s. 9d. Among preference shares, British Chemical & Biologicals 4 per cents were 20s., W. J. Bush 5 per cents 24s., and L. B. Holliday 4½ per cents 20s. 6d.

Shares connected with plastics showed small irregular movements, De La Rue easing to 25s. 6d. British Industrial Plastics 2s. shares were 4s. 9d., Erinoid strengthened to 6s., and British Xylonite were 66s. 3d. The 4s. units of the Distillers Company rose to 25s. 9d. on the full results and accounts. Ilford have further improved to 23s., General Refractories were 22s. 9d., United Molasses were already at 37s. 9d., and British Glues 4s. shares were firm at 19s. on market talk of share bonus possibilities.

Iron and steels remained very quiet, with those on the nationalisation list well below their official take-over levels. Dorman Long were 28s. 6d., United Steel 25s. 10½d., Stewarts & Lloyds 52s. 10½d., and Colvilles 31s. 10½d. Staveley have firmed up to 78s., awaiting the financial results, and Powell Duffryn have further improved to 27s. 3d. on hopes that the forthcoming dividend will be maintained.

Boots Drug showed steadiness at 48s. 6d. and Beechams deferred improved to 12s. 9d. Glaxo Laboratories were firm at £18¼. Oils lost a little ground, Shells easing to 68s. 9d., and Anglo-Iranian to £7 3/16. Trinidad Leaseholds were 23s. 9d. and Burmah Oil 58s. 9d.

CANADIAN PHOSPHATES

PHOSPHATE rock formations at Buckingham, in the Hull district of Quebec, after having been left abandoned for about 60 years, are now undergoing a promising period of revival as a result of the Quebec Smelting and Refining, Ltd., developing its extensive properties in that section of the province.

By far the greater part of Canada's annual phosphate requirements of approximately 300,000 tons now is imported from the U.S.A. and the company is reported to have set its Buckingham development objective at turning out between 30 and 40 per cent of Canada's entire phosphate needs in the future.

The Quebec Smelting and Refining, Ltd., interests have already carried out 26 drillings on their holdings so far this season. The ensuing assays have given returns ranging from 25 to 95 per cent, with the overall average about 35 per cent for all of the various analysis made.

The company is expected to have a pilot mill, with a daily capacity of approximately 25 tons, in operation some time this autumn. Its eventual daily production basis is said to have been established at 1000 tons, and with this end in view, the outlining of 1 million tons of phosphate rock of commercial grade is planned. The recovery of the actual usable rock, on this basis, is likely to be slightly more than 300 tons a day.

The mining of phosphate ore in the region of Buckingham begun on a moderate scale late in the last century, but was eventually abandoned around 1890, apparently because of the poor market conditions for the Canadian product. It is expected that the company will, initially, use a new type of concentrator and then treat the tailings by the flotation process.

Prices of British Chemical Products

Further Fluctuation in Lead Chemical Values

DURING the past week slightly more active trading conditions have been apparent on the industrial chemicals market and a fair amount of new business has been reported. Among the soda products, bicarbonate of soda, soda ash and caustic soda are all in good request and the potash chemicals continue firm at unchanged rates. Miscellaneous items in steady demand include the barium compounds, liquid chlorine, formaldehyde and hydrogen peroxide. Rather sluggish conditions persist on the coal tar products market, buying on home trade account being only of moderate extent.

MANCHESTER.—Holidays in Lancashire and West Riding industrial centres are still affecting business on the Manchester chemical market, although the next few weeks should see a return to normal conditions in this respect. On the whole, a fair amount of new inquiry for a wide range of light and heavy chemical products has been reported during the past week and reasonably steady deliveries to the soap, textile and other leading industrial outlets are being made. Relatively little change in the price position compared with a week ago has occurred. General buying of superphosphates and other fertiliser materials is broadening somewhat after the seasonal lull. In most sections of the tar products market rather dull trading conditions are still reported.

GLASGOW.—The Scottish chemical market has been much more active during the past week, although the demand for chemicals from paper manufacturers is on a reduced scale. Delivery of carbon tetrachloride has not been so good but it is understood that this will return to normal in the course of a week or two.

Price Changes

Rises: Lead carbonate, lead nitrate, red lead, white lead, litharge, zinc oxide.

Reductions: Borax, lead acetate, cresylic acid.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £61; 80% pure, 1 ton, £66; commercial glacial 1 ton £71; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.— Ton lots, d/d, £101 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 1d. per proof gallon; 5000 gal. lots, d/d, 2s. 2½d. per proof gal.

Alcohol, diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £40 per ton.

Ammonium Carbonate.—1 ton lots: MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £171 10s. per ton.

Antimony Oxide.—£140 per ton.

Antimony Sulphide.—Golden, d/d, as to quantity, etc., 4s. to 5s. per lb.

Arsenic.—Per ton, £40 5s. to £41 5s., according to quality, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder. Spot, 35/37%, £11 to £11 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £46; in 1-cwt. bags, commercial, granulated, £27; powdered, £30; extra fine powder, £31; B.P., crystals, £39; powdered, £39 10s.; extra fine, £40 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £77; powdered, £78.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £48; crystals, £53; powdered, £51-£53; extra fine powder, £53. B.P., crystals, £61; powder, £62; extra fine, £64.

Butyl Acetate BSS.—£149 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£145 10s per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £8 per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 7s. 7½d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 6d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 9d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 7d. per lb.

Copper Sulphate.—£36 5s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 8s. per 1-2 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £103 10s. per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

Glycerine.—Chemically pure, double distilled 1260 s.g. £123 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.

Lead Acetate.—White, £107, per ton.

Lead Carbonate.—British dry, ton lots, d/d, £115 10s.

Lead Nitrate.—About £116 per ton d/d in casks. MANCHESTER: £94.

Lead, Red.—Basic prices per ton: Genuine dry red lead, £105 10s.; orange lead, £117 10s. Ground in oil: red, £129 5s. orange, £141 5s. Ready-mixed lead paint: red, lots of 20 gals. and under 160 gals. in 1 gal. tins uncrated, £2 5s. per gal.; orange 3s. 6d. per gal. extra over the price for red.

Lead, White.—Dry English, in 8-cwt. casks, £115 10s. per ton. Ground in oil, English, under two tons, £135 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£103 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £20 to £25 per ton.

Magnesium Oxide.—Light, commercial, d/d, £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 7s. 4d.; smaller quantities dearer.

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 7½d. per gal.; pyridinised 64° O.P. 100 gal., 3s. 8½d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—Nominal.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9⅝d. per lb.; ground, 10⅝d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 11s. 1d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £7 9s. 6d. to £8 3s. 0d. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s per lb. d/d.

Soda Ash.—58° ex depôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £20 10s. per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £24 per ton, d/d, in drums; broken, £24 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £13 18s. 6d. to £16 3s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. to £7 2s. per ton; 140° Tw., arsenic free £4 18s. 6d. per ton; 140° Tw., arsenious, £4 11s. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £8 10s.; 5 to 9 cwt. £8 12s.; 2 to 4 cwt. £8 14s.; 1 cwt. £8 16s.

Tin Oxide.—1-cwt. lots d/d £25 10s.

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £66.; green seal, £65; red seal, £63. 10s.

Zinc Sulphate.—£31 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £36 15s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in September, £9 19s., rising by 1s. 6d., per ton per month to March 1950.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 14s. 6d. I.C.I. Special No. 1, £15 8s. 6d., rising by 2s. 6d. per ton per month to June, 1950. National No. 2 raised from £10 8s. 6d. to £10 18s. per ton, due to increase in potash content, as notified in new Board of Trade Order.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £11 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid. — Crystals, 11½d per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 10½d. to 1s. 0½d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 98%, 3s. 9d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 3s. 11d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £6 to £7 per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 21s. 6d. to 22s. 6d. per gal.; 90/160°, 19s. MANCHESTER: 19s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—August 24. The prices of all unrefined oils and fats and technical animal fats remain unchanged until September 3. (THE CHEMICAL AGE, *61*, 172.) There is no change in the prices of refined oils until September 10.

CLASSIFIED ADVERTISEMENTS

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THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN

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SITUATION VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order

GENERAL MANAGER

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SITUATIONS VACANT

APPLICATIONS are invited by the **MINISTRY OF SUPPLY** for the following unestablished appointments in the Division of Atomic Energy :—

(A) **WORKS CHEMISTS AND PHYSICISTS** (Windscale Works, Sellafield, Cumberland)., for supervisory duties connected with the operation of a large factory consisting of nuclear piles and associated chemical plant.

(B) **TECHNICAL ASSISTANTS** (Springfields Factory, Nr. Preston, and Windscale Works), for investigating and preparing reports on technical problems connected with the production and development work in atomic factories. The varied duties will give candidates experience in all aspects of large plant operations. Preference of site should be stated. Candidates should not be more than 28.

(C) **JUNIOR CHEMISTS AND PHYSICISTS** (Windscale Works), for supervising work involving Chemistry and/or Applied Physics. Candidates should be under 30.

Candidates for the above posts must either have an Honours Degree in Chemistry, Physics, or Chemical Engineering, Associateship of the Royal Institute of Chemistry, or Institute of Physics, or membership of the Institute of Chemical Engineers. Applicants for Post (A) should have at least three years' experience in a factory or industrial laboratory and for certain posts a knowledge of statistics will be required. Salary for Post (A) will be asssesed (if over 30) according to qualifications and experience, within the range of £570-£720 per annum, or (if under 30) according to age on the scale £330-£545. Posts (B) and (C) will be assessed according to age on the scale £330-£570 but subject to satisfactory service successful candidates could expect to be regraded to Post (A) and rise to the maximum £720. Applications from candidates holding the Higher School Certificate or equivalent will be considered for Post (C) but salary will be assessed according to age on the scale £220-£460. These candidates will be immediately eligible for the higher rates if the necessary qualifications are subsequently secured. Candidates will normally be confined to natural-born British subjects, born within the United Kingdom or one of the self-governing Dominions, of parents similarly born. Applications should be addressed to **Staff Section, Ministry of Supply, Division of Atomic Energy (Production), Risley, Nr. Warrington.**
Ri. 6461/LP.
4.8.'49.

APPLICATIONS are invited by the **Ministry of Supply** for the following appointment in the Division of Atomic Energy (Production) Springfields Factory, Salwick, Nr. Preston, Lancashire.

Plant Manager to be responsible for the operation of a section of a large chemical plant. Although the work falls mainly within the sphere of chemical plant operation, some metallurgical operations are also involved. Candidates must have an honours degree in Chemistry or associateship of the Royal Institute of Chemistry. They must have had several year's experience of chemical plant operation, preferably in the heavy chemical industry. They should have experience in the handling of corrosive materials, and inflammable solvents, and in precautions against toxic hazards. Knowledge of metallurgical operations would be advantageous. Experience in the management of labour is essential.

Salary will be assessed according to qualifications and experience within the range £997–£1,192 per annum.

Candidates will normally be confined to natural-born British subjects born within the United Kingdom or in one of the self-governing Dominions, of parents similarly born.

Applications should be addressed to **STAFF SECTION, Ministry of Supply, Division of Atomic Energy (Production) Risley, Nr. Warrington, Lancs.**
Ri. 6429-20-(28/7/49) HD.

SITUATIONS VACANT

APPLICATIONS are invited from **QUALIFIED ENGINEERS,** B.Sc. or A.M.I.Mech.E., for important Chemical Works, Manchester area. Applicants should not be over 40 years of age, and have experience in Maintenance, Chemical Plant Erection and Design. Position offered is permanent and progressive. Only men of proved ability need apply. Address in first instance, with particulars of qualifications and experience in detail, and salary expected. Box No. 2828, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

ASSISTANT WORKS ENGINEER required for construction and maintenance of Chemical Works in West Riding, Yorkshire. Applicant should be 25–35 years of age. Should have sound theoretical training and practical experience in mechanical engineering and chemical works plant. Salary approx. £600 p.a. Pension Scheme. Applicants should state age, full details of training and experience to WORKS MANAGER, Box No. 2834, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

HIS MAJESTY'S COLONIAL SERVICE, MALAYA. Vacancies exist for **CHEMISTS** in the Joint Department of Chemistry Federation of Malaya and Singapore. The work carried out by the Department includes all chemical work connected with liquors, toddy, opium, petroleum, textiles, etc.; the examination of exhibits relating to poisons, counterfeiting, arson, fire-arms, etc.; toxicological investigations, blood-testing, and clinical analysis; the testing of petroleum-carrying vessels, drinking water and sewage control (chemical and bacteriological); analysis of food and drugs, etc. The posts are on contract for three years, in the first instance, at a salary of $750 per month (£1,050 per annum), plus expatriation allowance of $150 per month (£210 per annum), plus variable cost-of-living allowance which is at present $150 per month (£210 per annum) for single man, $300 per month (£420 per annum) for married officers without dependent children, $375 per month (£525 per annum) for married officers with dependent children, i.e., total emoluments for a single man amount to £1,470 per annum, for a married man without family £1,680 per annum, for a married man with children £1,785 per annum.

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Write, giving brief details of age, qualifications and experience, to the **DIRECTOR OF RECRUITMENT (COLONIAL SERVICE), SANCTUARY BUILDINGS, GREAT SMITH STREET, S.W.1.**

LABORATORY SUPERVISOR required for the routine control laboratory of a chemical works in the West Riding of Yorkshire. Previous experience of inorganic analysis an advantage. Preference will be given to applicants between the ages of 28 and 35 years. Salary, £350-£416 per annum, according to experience. Box No. 2824, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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JOHNSON & PHILLIPS invite applications for a **CHEMIST** to take charge of their Rubber and Thermoplastics Cable Laboratory, under the direction of the Chief Rubber Technologist. Applicants must hold a Degree or its equivalent, in Chemistry, and must have a thorough knowledge of, and experience in, laboratory work associated with the production of rubber and thermoplastic cable insulants and coverings. They must also be capable of controlling staff and organising routine development work in the preparation of rubber and thermoplastic compounds and of undertaking investigations into the methods of processing. The appointment carries a salary commensurate in the first instance with the applicant's qualifications and experience, and offers good prospects to a man possessing ability and initiative. Applications, stating age, full particulars of experience, training and salary required, should be addressed to **Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, London, S.E.7.**

JOHNSON & PHILLIPS invite applications from men with thorough experience in the Rubber Cable Industry for appointment as **DEPUTY TO THE CHIEF RUBBER TECHNOLOGIST.** Candidates must have expert knowledge of compounding methods for natural and synthetic rubbers and thermoplastics, and be thoroughly conversant with the design, construction and application of all types of rubber and thermoplastic cables. The appointment carries a salary commensurate in the first instance with qualifications and experience. It affords wide scope for initiative and ability, and offers excellent prospects. Applications, stating age, full particulars of experience, training, and salary required, should be addressed to the **Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, London, S.E.7.**

JOHNSON & PHILLIPS invite applications for an **ENGINEER** to be responsible to the Cable Works Manager and to undertake the technical supervision of processes in the manufacture of rubber and thermoplastic cable, in close liaison with the chemical and technical staff. Candidates must have thorough experience of works' practice in the handling of rubber and thermoplastic compound and associated materials and must be capable of co-operating in development work associated with the translation of new materials and methods from laboratory to factory production. The appointment carries a salary appropriate to the applicant's experience and offers wide scope for the exercising of initiative and intelligence. Applications, stating age, full particulars of experience, training, and salary required, should be addressed to **Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, London, S.E.7.**

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NOTICE IS HEREBY GIVEN that Diffusion Alloys Limited seek leave to amend the Complete Specification of the Letters Patent No. 572,703 for an invention entitled "Improvements in or Relating to Metallic Coatings on Iron and Steel." Particulars of the proposed amendment were set forth in the Official Journal (Patents), No. 3158, dated August 24th, 1949. Any person may give notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before 26th September, 1949. J. L. BLAKE, Comptroller-General.

NOTICE IS HEREBY GIVEN that Diffusion Alloys Limited seek leave to amend the Complete Specification of the Letters Patent No. 574,737 for an invention entitled "Improvements in or Relating to Metallic Coatings on Iron and Steel." Particulars of the proposed amendment were set forth in the Official Journal (Patents), No. 3158, dated August 24th, 1949. Any person may give notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before 26th September, 1949. J. L. BLAKE, Comptroller-General.

WORKING NOTICE

THE Proprietors of the Patent No. 463437, for "Improvements In or Relating To Wood Pulp Adapted for Chemical Use," and No. 507040, for "Improvements In or Relating To Wood Pulp Adapted for Chemical Use," are desirous of entering into arrangements by way of licence and otherwise on reasonable terms, for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to HASELTINE LAKE & Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2.

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